

Pollen Grains in the House Dust of Kayseri, Turkey

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Abstract

As most people spend most of their time indoors, a considerable amount of attention has focused in recent years on human exposure to allergens of dust mite, cockroach, cat, and dog. However, little is known about the concentrations of pollen allergen in their homes. To the aim was identify indoor pollen grains during and out of pollination season in the Kayseri city. For their percentage values, pollen season periods and pollen concentration. Pollen grains from 46 taxa were identified over one year period. 25 taxa were of arboreal plants, whereas the others were of non-arboreal plants. The distribution of total pollen grains [grains/cm²] was as follows: arboreal plants and shrubs 31 %, herbaceous plants including Poaceae 20 %, other herbaceous plants 35 % and undetermined as 14 %. Pollen concentrations began to increase in April, reached their maximum level in May. The pollen calendar including all recorded pollen grains was displayed. Although we known how the allergens in settled dust are equilibrated with those in the atmosphere, the considerable high level of pollen in indoor dust even during periods when no pollen is present in the atmosphere may be an important cause of pollen allergy symptoms out of pollination season.

Key words: Allergy, pollen, house dust, indoor, Kayseri

INTRODUCTION

More than 20% of the human population shows symptoms of pollen allergy [1]. Symptoms are triggered off pollen grains as well as pollen-derived particles appeared as potent allergens in the ambient air during summer [2, 3]. Furthermore, some sensitive pollen-allergic patients reported on allergenic symptoms not only during the pollen release but also both before and after the pollen period [4, 5]. Because pollen grains are considered to be a risk factor for pollen allergy, generally pollen sensitive patients are advised to stay indoors during peak pollen periods. On the contrary to above there is not much information available about how much of pollen allergens reach the indoor environment and it appears possible that "indoor pollen" could significant contribute to allergen exposure [6].

As people spend most of their time indoors, a considerable amount of attention has focused in recent years on human exposure to allergens of dust mite, cockroach, cat, and dog [7]. However, little is known about the concentrations of pollen allergen in residential environments. Convincing evidence has been found that pollen allergens are present in settled dust indoors [8, 9]. Indoor exposure to pollen allergens can be assessed by counting the numbers of pollen grains in house dust samples [10].

Generally physicians have urgent patient with hay fever to study indoors; however, this advice is not enough. An outdoor aeropalynological study has been done in Kayseri [11], Up to our knowledge; there was no study about in door pollen of Kayseri.

There for aim of this study was to identify indoor pollen grains during and outside the pollination season in the Kayseri city, their percentage values, pollen season periods and pollen concentration.

MATERIALS AND METHODS

Study area

Kayseri is a large city in Central Anatolia, Turkey. It is the seat of Kayseri province with 1.1 million inhabitants at an elevation of 1,050 meters above sea level (38° 44' 0" N, 35° 29' 0" E) on the foot of the extinct volcano Mount Erciyes (3,917 meters).

Local vegetation

The study area is taking place entirely in the Irano-Turanian phytogeographic region. The main vegetation types in the area are steppe, rock, forest, hygrophilic, fresh-water and halophytic [12].

Quercus spp. is the dominant arboreal species, with the *Populus tremula*, *Salix spp.*, *Rhamnus petiolaris*, *Pistacia atlantica*, *Prunus divaricata*, *Cerasus prostrata*, *Amygdalus communis*, *A. orientalis*, *Juniperus communis*, *J. oxycedrus*, *Abies cilicica* subsp. *cilicica*, *Picea orientalis*, *Pinus sylvestris* and *P. nigra* following in importance. The most abundant shrubs are: *Rosa foetida*, *R. hemispherica*, *Berberis crataegina*, *Jasminum fruticans*, *Colutea cilicica*, *Rubus caesius* and *Cotanaster integerrimus*. In addition to natural species, some species (*Acer negundo*, *Cedrus libani*, *Morus spp.*, *Alnus*

spp., *Fraxinus* spp., *Salix babylonica*, *Juglans regia*, *Coryllus avellana*, *Cedrus libani*, *Pinus* spp.) can be seen in the gardens and streets of Kayseri [12].

In the herbaceous stratum, the most dominant are: *Stipa pulcherrima*, *Cynodon dactylon*, *Poa bulbosa*, *Chenopodiaceae*, *Phleum alpinum*, *Hordeum murinum*, *Trisetum turcicum*, *Artemisia caucasica* and *Alyssum minutum*, among others [12].

Local climate

The study area has a Mediterranean climate characterized by dry summers and warm temperatures and precipitation during the winter months. The seasonal precipitation regime during the year is spring, winter, autumn and summer (SWAS). This is a typical second variant of the East Mediterranean climate. In Kayseri, the annual mean temperature is 10.6 °C. The maximum mean temperature is 30.5 °C, in July and August. The minimum mean temperature is -7.6 °C, in January.

Dust sample collection

From September 1993 to August 1994, dust samples were collected from 7 homes located at different regions of Kayseri city centre. For each house, A S6945 (Arçelik AŞ., Turkey) vacuum cleaner was used for sampling. Dust samples were collected from all fields of houses by the owner on daily bases. Each sample was obtained by vacuuming every day for monthly. Filter papers were collected from each house in the end of the month. Cross contamination of samples was avoided by using a different filter paper each use and dust particulate in vacuum cleaner blown out repeatedly prior to the next use. Dust samples were sieved to remove large particles and fiber. The fine dust was suspended in distilled water in a proportion of 1 g fine dust per 10 ml distilled water. The dust suspensions were rotated and pellet harvested by centrifugation (2000 rpm, 15 min with clinical centrifuge).

Microscope slides were then prepared, using glycerin jelly with fuchisin, for determination and counting number of pollen as describes Wodehouse [13]. Pollen grain determined and counted by Olympus BH-2 light microscope at 100x and 20x objective lens. Pollen count was expressed here as a number of pollen grains per square centimeter.

RESULTS and DISCUSSION

In the house dust of Kayseri, pollen grains from 46 taxa were identified over one year period. 25 taxa were of arboreal plants, whereas the others were of non-arboreal plants. The distributions of total pollen grains (grains/cm²) were as follows: arboreal plants and shrubs 31 %, herbaceous plants including Poaceae 20%, other herbaceous plants 35% and undetermined 14% (Fig. 1).

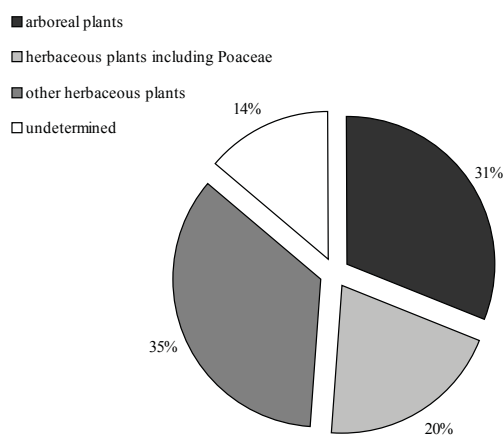


Figure 1. The Percentage of total pollen grains.

Pollen concentrations began to increase in April and reached their maximum level in May (Fig. 2). In Fig. 3, the pollen calendar including all recorded aeroallergens was displayed. Some allergenic pollen grains such as Gramineae, *Chenopodiaceae*, *Plantago*, *Quercus*, and *Pinaceae* were found in high concentrations. Our findings were also supported by the work of Kaplan [14] in which with pollen types were responsible for many cases of pollinosis.

Although we know how the allergens in settled dust are equilibrated with those in the atmosphere, the considerably high level of pollen in indoor dust even during periods when no pollen was present in the atmosphere might be an important cause of pollen allergy symptoms out of pollination season. Thus, our findings support the earlier claim that the essential source of indoor pollen allergens, apart from pollen itself, was mainly allergen-loaded dust carried indoors by passive transport or opened windows [8].

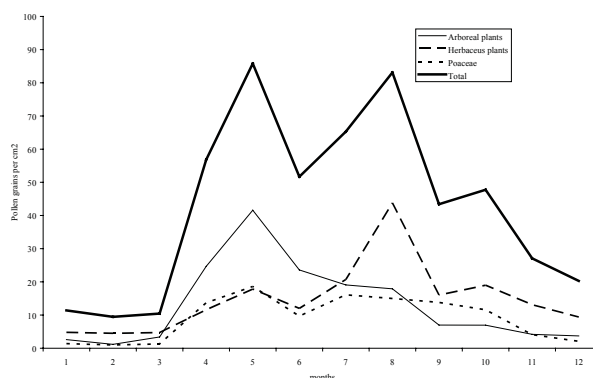


Figure 2. Average indoor pollen concentrations for the 1-year period of records in city centre of Kayseri.

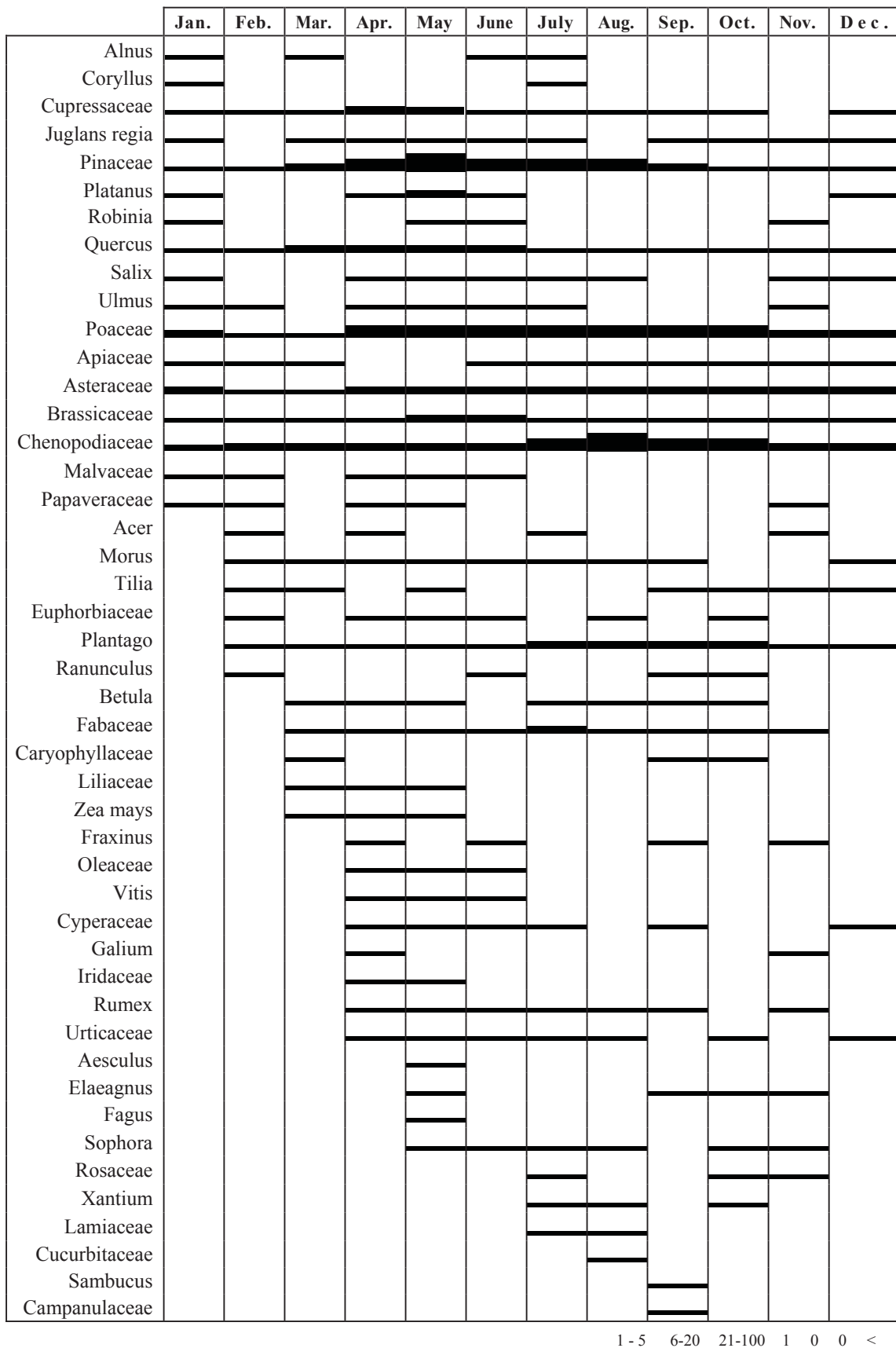


Figure 3. Pollen calendar of 46 pollen taxa in summed monthly average values (grains/cm²) for the 1-year period of records in the house dust of Kayseri. It is also presented the scale with the specific levels of pollen concentrations.

Our observations may explain possibly continuing symptoms of pollen allergic subjects indoors during periods when little or no pollen was present in the atmosphere of Kayseri. Some other studies were worth mentioning in this context [6, 10].

Finally, it is understood that the homes may constitute a significant reservoir of pollen allergen. Moreover, the pollen allergens seem to be one of the perennial allergens in Kayseri.

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