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Pollen calendar of allergenic grasses in Kupwara district of Kashmir valley

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ABSTRACT

Several airborne pollens are important environmental bio-pollutants, causing various allergic disorders in susceptible persons. Therefore, it is essential to study the period and duration of the flowering of the plants growing in a particular region/area. For the area Kupwara (North Kashmir), a Pollen calendar consisting of 57 species which fall under 35 genera has been compiled in order to provide an understanding of habit, period of pollen release and their dispersal from the flowers, pollen load in the atmosphere and the influence of meteorological parameters. The main object of this research work is to provide information regarding the frequency of airborne pollen in atmosphere to the physicians, or medical practitioners. The maximum flowering period is recorded from July to September.

1. Introduction

It is becoming increasingly evident that pollen is only one of many environmental factors, collectively designated as "pollutants", which are suspected to contribute to the world wide increase in hypersensitivity experienced by the human population, especially in developed countries. Hence to study pollen, it is mandatory to know the exact period of flowering among plants along with their correct nomenclature. In India, especially in tropical climates, some research work has been carried out on compiling the flowering calendar and pollination

calendar (Appana, 1980; Das et. al., 1987; Mari Bhat et al., 1982; Panda et al.,1992) However, the Kashmir Himalaya, which is a major part of the western Himalaya and enjoys mostly temperate-alpine climate, has not been investigated for such type of research work. Even though it is rich in angiospermic plants, especially grasses. A large number of plants have already been reported to produce allergenic pollen in Europe and other parts of the globe. So an effort has been made to conduct extensive survey of the plants growing in Kupwara and its environment of Kashmir Himalaya. Previously such type of research information was not available from this region and therefore detailed pollen calendar has been compiled for the first time (Table 1).

2. Materials and methods

In order to prepare the pollen calendar of grasses for district Kupwara of Jammu and Kashmir state, daily airborne pollen grains were collected using vertical cylinder rod samplers and Rotorod samplers during the flowering season and a detailed pollen calendar of grasses was compiled for 2007–2009. A variation in flowering periods in some species growing at different altitudes and areas was recorded. The herbarium specimen was identified by matching with a voucher specimen deposited in the herbarium, of the Department of Botany, University of Kashmir, Srinagar, India (KASH). Flowering periods were correlated with other parameters like behavior altitude, pollen emission and pollen load in the atmosphere. The genera and species of grasses were arranged alphabetically (Table 1). The pollen load in the atmosphere at various altitudes was recorded with vertical cylinder rods and Rotorod samplers (Reddy, 1970; Agasha, 1980).

Table 1
Pollen calendar showing variation in behaviour, altitude flowering period, pollenincidence and pollen load (peak). Growing in district Kupwara of Kashmir,(India).(Behaviour: Ann = Annual and Per = Perennial)

Name of the Species	Behaviour	Altitude range (meters)	Flowering periods	Pollen incidence	Pollen loads (peaks)
Aegilops	Ann.	1,700–2,000	April–July	May–June	June
A. tauschii					
Agropyron	Per.	1,700–2000	May–July	June–July	June
A. Semicostatum					
Agrostis					
A. canina	Per.	1,700–3,100	June–August July–	July–August July–	July
A. pilosula	Per.	1,700–2,500	October June–	August July–	July
A. stolonifera	Per.	1,700–2,700	October July–	August July–	July
A. subaristata	Per.	1,700–2,300	August	August	July
Alopecurus					
A. acqualis	Ann.	1,700	April–May April–	May	May
A. arundinaceous	Per.	1,700–2,100	June	May–June July–	May
A. himalaicus	Per.	3,200–3,800	July–September.	August	August
Arthraxon					
A. lancifolius	Per.	1,700–1,900	July– September	July–August May–	August
A. prionodes	Per.	1,700–1,900	April–June	June	May
Avena					
A. fatua	Ann.	1,700–1,900	April–June	May–June	May
Bothriochloa					
B. pertusa					
B. glabra	Per.	1,700–2,300	July–October July–	July–August July–	August
	Per.	1,800–2,000	September	August	August
Brachiaria					
B. eruciformis					
B. mollis	Ann.	1,700–1,800	July–September	July–August June–	August
	Ann.	1,700–1,800	May– September	August	July
Capillipedium					

C. Parviflorum					
	Per.	1,700	July–September	July–August	August
Chrysopogon					
C. echinulatus	Per.	1,700–2,300	July–October	July–August	July
Cynodon					
C. dactylon					
	Per.	1,700–2,400	May–November	June–September	September
Dactylis					
D. glomerata	Per.	1,700–2,700	April–July	May–June	May
Digitaria					
D. adscendens					
D. granularis	Ann.	1,700	July–August	July–August July–	July
D. sanguinale	Ann.	1,700–1,800	July–September	August July–	July
	Ann.	1,700–1,900	June-September	August	July
Echinochloa					
E. colonum	Ann.	1,700–1,900	June- September	July–August July–	August
E. crusgalli	Ann.	1,700–1,900	July– September	August	August
Hordeum					
H. leporinum	Ann.	1,700–1,800	April–June	May–June	May–June
Koeleria					
K. cristata	Per.	1,700–2,200	April–May	May	May
Lolium					
L. temelentum	Ann.	1,700–1,800	May–June	May–June	May
Lophochloa					
L. phleoides					
	Ann.	1,700–1,800	April–May	May	May
Muhlenbergia					
M. huegelii					July
	Per.	2,500	July–September	June–August	
Oryzopsis					
O. munroi					
	Per.	1,700–2,300	May–September	June–August	July
Pennisetum					
P. flaccidum					
P. orientale	Per.	1,700–2,500	May– November	June–September	August
	Per.	1,700–2,500	May– November	June–September	August
Phacelurus					
P. speciosus	Per.	1,700–2,300	July–September	June–August	July
Phalaris					
P. arundinacea	Per	1,700	May–June	May–June	May
Phleum					
P. alpinum	Per.	2,700–3,700	August–September	August	August
P. graecum	Ann.	1,800–2,500	May–June	May–June	June
P. paniculatum	Ann.	1,700–2,000	May–June	May–June	May
Phragmites					
P. communis	Per.	1,700–2,200	July–October	July–September	August
Poa					
P. annua			March–November		June
P. angustifolia	Ann.	1,700–2,300	April–June	May–September	May
P. bulbosa	Per.	1,700–2,100	April–May	May–June	May
P. pratensis	Per.	1,700–2,600	May–September	April–May	May
P. sterilis	Per.	1,700–2,100	April–May	May–August	April
P. stewartiana	Per.	1,800–2,900	April–May	April–May	April

	Per.	1,700–2,600		April–May	
Polypogon					
P. fugax	Ann.	1,700–2,300	June–September	June–September	August
Sclerochloa					
S. dura	Ann.	1,700	May–July	June–July	June
Setaria					
S. glauca	Ann.	1,700–1,900	August–October	August–October	August
S. viridis	Ann.	1,700–2,100	July–September	August-September	September
Sorghum					
S. halepense	Per.	1,700–1,900	July–October	July–September	August
Stipa					
S. sibirica	Per.	1,700–2,800	August–October	September–October	September
Themeda					
T. anathera	Per.	1,700–2,500	July–October	August–October	August
Tripogon					
T. purpurascens	Per.	1,700–2,100	July–September	August–September	August
Vulpia					
V. myuros	Ann.	1,700–2,500	April–June	April–June	May

3. Results

57 species of grasses growing at various altitudes in the area of Kupwara district of Kashmir were recorded and identified. All these species were studied for behavior, altitude, flowering period, pollen emission, pollen peaks and pollen load. The list of species includes the species of grasses already known as source of hayfever in Germany, France, Canada, USA, Africa, Central or South America and the Mediterranean (Table 2). The prevalence of these grasses has now been recorded for the first time in above district of North Kashmir.

4. Flowering calendar

A flowering calendar for all the species of grasses growing at various altitudes in the area was worked at. The flowering periods reveal that grasses in this region flower just after the rainy season is over. The flowering starts earlier at lower altitudes and late at higher altitudes. Some grasses flower for a short period (April–May or April June) as can be seen in Table 1. Normally the flowering of all the grasses ends in September–October of the same year. The peak flowering periods generally lasts for one–two months.

5. Discussion

A comprehensive flowering calendar of grasses growing in the area is important and useful for diagnosis and treatment of allergic disorders and for research studies related to plant breeding systems. In the present studies, an effort has been made for the first time to record pollen peaks in the areas of the study. Such type of study needs further investigation to assess the total pollen grain load in the atmosphere of this region and correlate the data with clinical trials and tests. The present investigation is interesting (Table 2) as it records the pollen of grass species already known as allergenic in other parts of the world with cold temperate climate like UK, Germany, France, Canada, USA, Africa, Central or Southern America, Mediterranean region (Hyde et al., 1945; Stanley et al.,

1983).Besides, it has been observed that early spring rain has decisive influence on flowering initiation and duration of the peak flowering periods.

Table 2
Distribution of the principal grasses producing allergenic pollen in the world and in the district of Kupwara in Kashmir Himalaya (India)

Botanical name of the grass	U.S.A.	Central or South America	Canada	Africa	U.K.	Germany	France	Mediterranean	Kupwara district
Agrostis A. stolonifera	+	+	+	-	+	+	+	+	+
Avena A. fatua	+	+	-	-	+	+	+	+	+
Cynodon C. dactylon	+	+	-	+	+	+	+	+	+
Dactylis D. glomerata	+	+	-	-	+	+	+	+	+
Eragrostis E. pilosa	-	-	-	-	+	+	+	+	+
Lolium L. temelentum	+	+	+	-	+	+	+	+	+
Phleum P. alpinum	+	+	+	-	+	+	+	+	+
Poa P. pratensis	+	+	+	-	+	+	+	+	+

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