ज्ञान-विज्ञान विमुक्तये

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE FINAL REPORT OF THE WORK DONE ON THE MAJOR RESEARCH PROJECT ENTITLED

"MONITORING OF POLLEN INCIDENCE IN THE ATMOSPHERE OF HOOGHLY DISTRICT, WEST BENGAL WITH REFERENCE TO ALLERGIC DISORDERS."

File No. 41-444/2012 (SR) Dt. 17 th July,2012

Submitted by

PRINCIPAL INVESTIGATOR : Dr. Jiban Kr.Pal

HOD & Associate Professor in Botany

Department of Botany

Netaji Mahavidyalaya

Arambagh, Hooghly, Pin- 712601

ARAM-NM-595 Date: 28.06.2016

To
The Under Secretary (FD - III)
University Grants Commission
Bahadur Shah Zafar Marg
New Delhi – 110002

Your Letter No. – F. 41-444/2012(SR) Dated: 16 July, 2015

Subject – Submission of final report of the work done of the project

Respected Sir,

I am submitting the final report of the work done of the Major Research Project entitled, "Monitoring of pollen incidence in the atmosphere of Hooghly district , West Bengal with reference to allergic disorders" (File No. F. 41- 444/2012(SR) Dt. 17th July, 2012).This is for your kind information and taking necessary action.

With regards,
Yours faithfully,

Jiban Kumar Pal
28/06/2016

Dr. Jiban Kumar Pal
Principal Investigator
UGC Major Research Project

DR. J.K. PAL
ASSOCIATE PROFESSOR
DEPARTMENT OF BOTANY
NETAJI MAHAVIDYALAYA
ARAMBAGH - 712601

Enclosure:
1.Two hard copy of the Final Report
2.One soft copy (CD Form)

Forwarded
28/06/16

Principal
Netaji Mahavidyalaya
Arambagh, Hooghly

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI- 110002

Annexure- IX

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. Title of the Project : MONITORING OF POLLEN INCIDENCE IN THE ATMOSPHERE OF HOOGHLY DISTRICT, WEST BENGAL WITH REFERENCE TO ALLERGIC DISORDERS

2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR : Dr. Jiban Kumar Pal
Office –Netaji Mahavidyalaya,P.O.- Arambagh,Dt.Hooghly,PIN–712601,West Bengal, India
Residential–Vivekanandapally,Ward No.13,P.O.-Arambagh,Dt.–Hooghly,Pin– 712601, West Bengal , India

3. NAME AND ADDRESS OF THE INSTITUTION : Netaji Mahavidyalaya,P.O.– Arambagh Dt – Hooghly,Pin–712601,West Bengal,India

4. UGC APPROVAL LETTER NO. AND DATE : 41- 444/2012(SR) Dt.17th July,2012

5. DATE OF IMPLEMENTATION : 04.09.2012

6. TENURE OF THE PROJECT : 03 Years,01.07.2012 to 31.12.2015(Extended for 6 months by UGC).
7. TOTAL GRANT ALLOCATED : Rs.9,42,000/-

8. TOTAL GRANT RECEIVED : Rs.8,81,880/-

9. FINAL EXPENDITURE : Rs.9,49,275/-

10. TITLE OF THE PROJECT : MONITORING OF POLLEN INCIDENCE IN THE ATMOSPHERE OF HOOGHLY DISTRICT, WEST BENGAL WITH REFERENCE TO ALLERGIC DISORDERS

11.OBJECTIVES OF THE PROJECT : Annexure - A

12.WHETHER OBJECTIVES WERE ACHIEVED : Yes (Annexure – B)
(GIVE DETAILS)

13.ACHIEVEMENTS FROM THE PROJECT : Annexure - C

14. SUMMARY OF THE FINDINGS : Annexure - D
(IN 500 WORDS)

15. CONTRIBUTION TO THE SOCIETY : Annexure- E

(GIVE DETAILS)

16 WHETHER ANY PH.D. ENROLLED/PRODUCED OUT OF THE PROJECT: Yes, Annex-F

17. NO. OF PUBLICATIONS OUT OF THE PROJECT : 04, Annexure- G
(PLEASE ATTACH)

Jibankumar Pal
28/06/2016

(PRINCIPAL INVESTIGATOR)

DR. J.K. PAL
ASSOCIATE PROFESSOR
DEPARTMENT OF BOTANY
NETAJI MAHAVIDYALAYA
ARAMBAGH - 712601

28/06/16

(~~REGISTRAR~~/PRINCIPAL)

Principal
Netaji Mahavidyalaya
Arambagh, Hooghly

Annexure- A

OBJECTIVES OF THE PROJECT

1. Description of the pollen grains of flowering plants in different seasons of the year.

2. Enumeration of the diagnostic features of the pollen grain of a species.

3. Preparation of the pollen identification key of the flora.

4. Monitoring of pollen incidence in the atmosphere

Annexure- B

WHETHER OBJECTIVES WERE ACHIEVED (GIVE DETAILS)

The objectives of the project were achieved.

Keeping in view of the year wise plan of the work,the field survey of the local flora in different sites (Tirol,Goghat,khanakul,Chandannagore,Sreerampur, Ballydiwanganj,Kamarpukur,Mayapur and Arambagh town) of the district Hooghly , West Bengal was made for the collection of plant specimens with pollineferous material since September , 2012. The pollineferous material i.e. flowers,flower- buds, anthers of the flowering plants from the respective study sites was collected in different seasons of the year and preserved in FAA (Formalin Acetic Acid) solution. The pollen morphotypes of the collected pollineferous plant material was studied following Acetolysis method.(Erdtman, 1952).

1. Pollen slides of 105(One hundred five only) plant species were prepared following Acetolysis method. Microphotographs (Figure 1) of pollen grain were taken from the prepared slides.

2. Different pollen morphological parameters such as shape, size, symmetry, apertural pattern and exine configuration was studied. The pollen types and its measurements were determined considering Polar axis (P), Equatorial axis(E), Length of colpa, Diameter of pore, Exine thickness and Exine ornamentation. Diagnostic features of the pollen grains of the investigated plant species was enumerated by Light Microscopy (Table1).

3.Scanning Electron Microscopic (SEM) study was carried out for the observation of finer structures of pollen grains in detail (Figure 2).

Table 1: Pollen parameters of some investigated taxa by light microscopic study

Pollen type	Polar axis (P) (µm)	Average (µm)	Equatorial axis (E) (µm)	Average (µm)	Length of colpa (µm)	Diameter of pore (µm)	Exine thikness (µm)	Exine ornamentation
3-colporate	20.00-33.00	26.50	22.00-34.50	28.25	7.50-10.00	2.50-5.00	3.75-4.50	Punctitegillate
3-colporate	22.50-27.50	25.00	17.50-22.50	20.00	15.00	10.00	±1.25	Punctitegillate
3-colporate	22.50-30.00	26.25	20.00-27.50	23.75	10.00-12.50	5.00-7.50	3.75-5.00	Punctitegillate
3-colporate	17.50-27.50	22.50	15.00-25.00	20.00	7.50-8.00	5.00-7.50	5.00-6.25	Punctitegillate
3-colporate	20.00-25.00	22.50	25.00-30.00	27.50	17.50	1.25-2.50	±1.25	Punctitegillate
3-colporate	32.50	32.50	35.00	35.00	15.00	5.00	±2.50	Punctitegillate
3-colporate	55.00-100.00	77.50	50.00-92.50	71.25	45.00-90.00	17.50	±2.50	Reticulate
3-colporate	52.00-65.00	58.75	45.00-62.50	53.75		1.25-7.50	±5.00	Reticulate

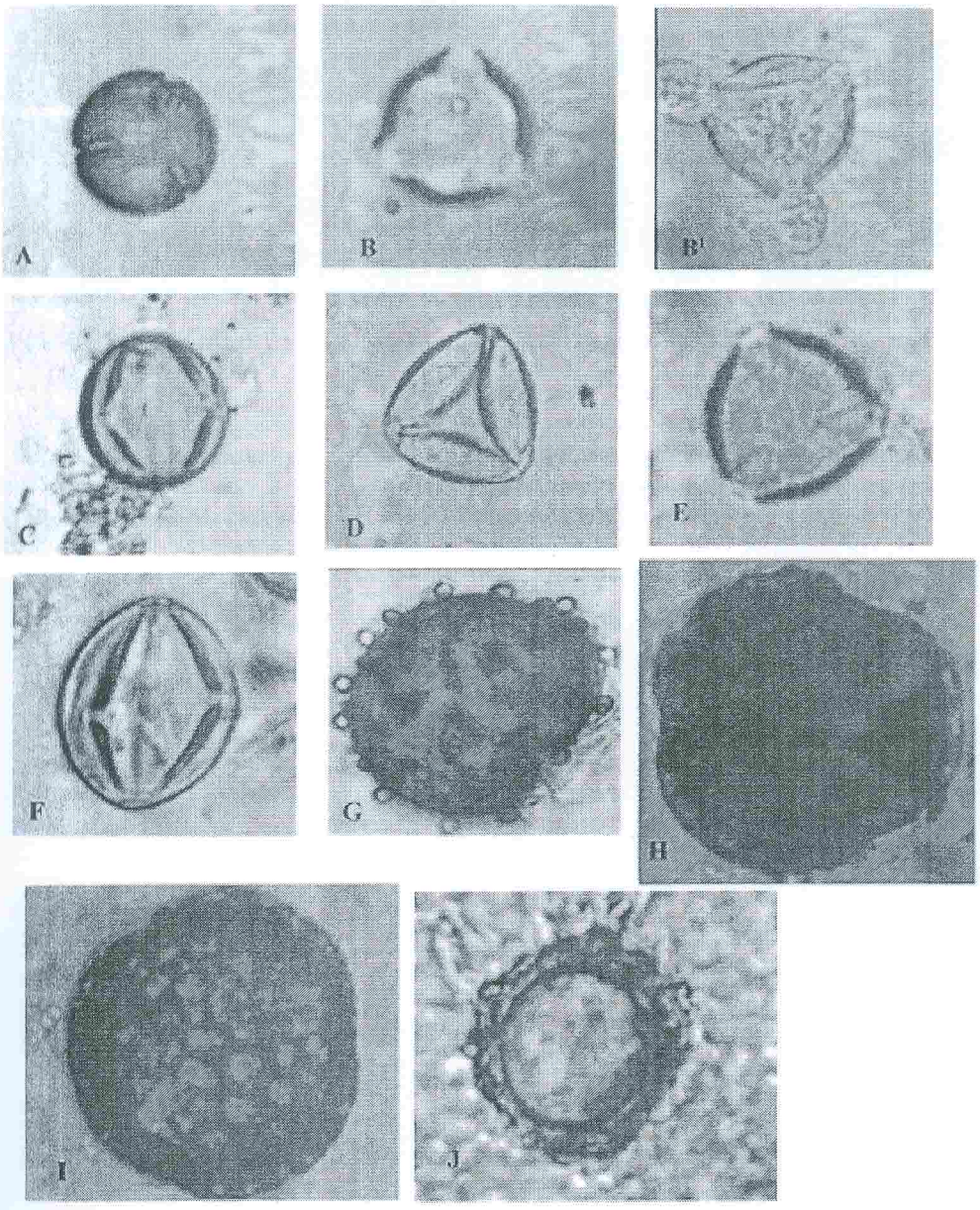

Figure1 Acetolysed pollen grains. (x 400)
A. Cassia sophera, B & B'. Cassia alata,
C. Cassia occidentalis, D. Cassia fistula,
E. Cassia tora, F.Cassia siamea,G.Bauhinia purpurea,
H.Delonix regia, I. Peltophorum pterocarpum,
J.Tamarindus indica.

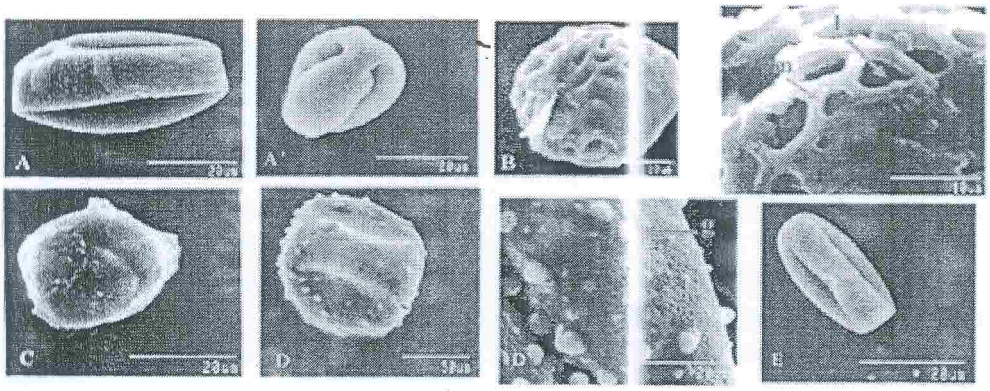

Figure 2 SEM Microphotographs of pollen grains of s me plant taxa investigated

A. *Cassia sophera* (Equqatorial view), A'. *C. s ohera* (Polar view),
B. *Peltophoram pterocarpum* (Polar view), B'. *Pe ophorum pterocarpum*
(Surface view showing Muri and Lumen), C. *Tamar dus indica* (Polar view),
D. *Bauhinia purpurea* (Polar vi w),
D'. *Bauhinia purpurea* (Surface view showing Gemma), E. *C talaria retusa* (Equqatorial view).

l= Lumen, m= Muri, g= Gemm a.

The pollen grains were mostly 3 – colporate. Some plant taxa possesses polyad grains. After critical analysis of the diagnostic features of the pollen grains, it is suggested that the plant taxa having 3-colporate pollen grains are advanced whereas the plant taxa having polyad or colpate grains are to be considered primitive in the scale of evolution. Based on the above diagnostic features, pollen identification key is prepared.

With a view to studying pollen incidence in the atmosphere of Hooghly district, aerobiological survey for capturing bio- particles i.e. pollen grains was carried out with the help of Rotorod Sampler in different seasons throughout the year.
The pollen incidence in the atmosphere of Hooghly district was studied and analysed critically. Aero-samples were collected from different study sites of Hooghly district for determining atmospheric pollen incidence. It was calculated in terms of value expressed by percentage as follows (Table 2).

Table 2 Pollen incidence in the atmosphere of Hooghly district

Time	Pollen incidence (%)
May	63.25
June	61.35
July	64.57
August	59.00
September	60.50
October	60.75
November	72.23
December	65.88
January	52.55
February	98.93
March	91.55
April	79.33
Average Incidence (%)	69.15

Annexure C

ACHIEVEMENTS FROM THE PROJECT

1. Diagnostic features of pollen grains of investigated plant species of Hooghly district are enumerated.
2. A pollen identification key is prepared.
3. Pollen incidence of Hooghly district is determined.

Annexure D

SUMMARY OF THE FINDINGS (IN 500 WORDS)

Keeping in view the year wise plan of work, the field survey of the local flora in different sites (Tirol, Goghat, Khanakul,Chandannagore,Sreerampur, Mayapur, Kamarpukur, Ballydiwanganj and Arambagh town) of Hooghly district was made for the collection of plant specimens and pollineferous materials like flowers, flower-buds and anthers since September,2012 to April,2014. Pollen slides were prepared simultaneously since September,2012 to April,2014 for the study of pollen morphotypes. In the year 2012-2013, along with the collections of plant specimens, herbarium sheets of the collected plant specimens was prepared for its preservation. The herbarium specimens of the collected plants were identified. In the years, May 2014 to April 2016 aerobiological survey was conducted with the help of Rotorod Sampler for the collection of aero-samples with a view to determine the pollen incidence in the atmosphere of Hooghly district.

Pollen slides of 105 plant species were prepared following Acetolysis method of Erdtman.
Different pollen morphological parameters such as shape, size, symmetry, apertural pattern and exine configuration was studied. Pollen types and its measurements were determined considering Polar axis (P), Equatorial axis (E), Length of colpa, Diameter of pore, Exine thickness and Exine ornamentation. Pollen grains were studied by Light Microscopy (LM) and Scanning Electron Microscopy (SEM).

Different pollen grains found in aero-samples such as *Carica papaya, Moringa oleifera, Delonix regia, Cassia sophera, Cassia alata, Cassia occidentalis, Peltophorum pterocarpum* etc. are supposed to be responsible for allergic disorders of the people in this area. However, it is yet to be established through proper identification of proteins from the grains.

The grains were mostly 3- colporate, some were colpate and others polyad. The pollen incidence in the atmosphere of Hooghly district was comparatively lower in winter (52.55%).It was highest in spring(98.93%). The yearly average incidence was 69.15% in the years May 2014 to April 2016. Some fungal spores such as *Alternaria, Rhizopus* and *Aspergillus* etc. were also found in aero-samples.

Annexure E

CONTRIBUTION TO THE SOCIETY (GIVE DETAILS)

1. To aware the people of the society about allergic disorders in human by pollen grains and fungal spores.
2. Possibility of establishing a clinic for the tests of allergy in human.
3. To control quality of air.
4. To acquire knowledge about atmospheric fungal spores causing different diseases in crop plants in the agricultural fields.

Annexure F

WHETHER ANY PH. D ENROLLED/ PRODUCED OUT OF THE PROJECT

Pritha Bhattacharya (Sasmal), Project Fellow of the Major Research Project registered herself for Ph. D degree of the University of Burdwan under my guidance and supervision. She has completed research works of the project successfully. The Xerox copy of her Ph. D registration is attached herewith.

Annexure G

NO. OF PUBLICATIONS OUT OF THE PROJECT

Four research papers were published out of the project and acknowledged to UGC, New Delhi for financial assistance. Xerox copy of the published papers are attached herewith.

1. Bhattacharya (Sasmal) P, Pal JK, Biswas P and Pal PK (2013). Pollen morphological study of some plant taxa from Arambagh region of Hooghly District, West Bengal, India. Int J Curr Sci. 7 : E 97- 103. ISSN 2250- 1770.

2. Bhattacharya (Sasmal) P and Pal JK (2013). Scope of research on pollen grains in Arambagh region of Hooghly District (India) with reference to allergic disorders. Int J Curr Sci. 8 E ; 09- 15. ISSN 2250- 1770.

3. Bhattacharya (Sasmal) P, Biswas S and Pal JK (2015). Palyno- taxonomic study of some plant taxa of Fabaceae from Arambagh region of Hooghly district, west Bengal, Eastern India. Bio Sci Disc Vol. 6(1) : 27- 34. ISSN 2229- 3469 (Print), 2231- 024X (Online).

4. Bhattacharya (Sasmal) P and Pal JK (2015). Immune Response to Pollen Allergic Reaction. FOCUS Vol. 6 : 75- 83. ISSN 2278- 1501.