KIRORI MAL COLLEGE

(University of Delhi,) Delhi-110007

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Date: 27.2.2012

The Dean,
Research,
University of Delhi,
Delhi
Subject:- Submission of "Innovation project" from Kirori Mal College.

Dear Sir,

This is in continuation of your letter No. Dean (R)2012/423 dated January 23, 2012, wherein University of Delhi had invited proposals for funding of Innovation Projects from joined teams of Teachers and Students. I am hereby forwarding the entitled, **"To assess the mutagenic potentials of some commonly encountered environmental pollutants and therapeutic agents"** which is being jointly been submitted by three teachers of the college, Dr. Renu Kathpalia , and Dr. Manju A. Lal from the Department of Botany and Dr. Anita Kamra Verma from the Department of Zoology,

The college takes responsibility of submitting a final utilization certificate to the Registrar, University of Delhi, at the completion of first and second (final) phases stating that the funds have been duly utilized for the purposes that they were sanctioned for and have been audited. We also assure that the project will be housed in the college and all the equipments purchased during the running of the project shall revert to the college for use within the premises of the college by the students of the college.
Thanking you,

Yours sincerely

Principal

(BHIM SEN SINGH)
PRINCIPAL
KIRORI MAL COLLEGE
(UNIVERSITY OF DELHI)
DELHI - 110 007

Innovation Project Submitted by Kirori Mal College

Project Title: To assess the mutagenic potentials of some commonly encountered environmental pollutants and therapeutic agents.

Project Investigators :

Department of Botany : i) Dr Manju A. Lal ii) Dr Renu Kathpalia

Department of Zoology : i) Dr Anita Kamra Verma

Introduction:

Over the last three decades there has been an increasing global concern over the public health impacts attributed to environmental pollution. Environmental pollution is caused by usage of various pesticides, herbicides and other chemicals in the agricultural practices. These chemicals gain entry in the food stuff and has been potential risk to health of the people. Food preservatives are being used indiscriminately to enhance the shelf life of food. Industrial effluents are a main source of direct and often continuous input of pollutants/toxicants into aquatic ecosystems with long-term implications on ecosystem functioning (Odeigah and Osanyipeju, 1995; Chan *et al*., 2003; Lah *et al*., 2004; Smolders *et al*., 2004).

Plants have been known to be a standard material to study the potential mutagenic role in cytotoxic and genotoxic effects of various pollutants, because of simplicity with which these can be grown in lab conditions and the ease with which the conditions in which these are grown can be manipulated. Onion has been a standard indicator species for short bioassay techniques (Wierzbicka 1994, Turkoglu 2007, Geraskin *et al* 2011). Various studies have been conducted to demonstrate the cytotoxic and genotoxic effect of food preservatives such as **sodium benzoate** (Turkoglu, 2007), herbicides such as **isoproturon** (Badr & Elkington 1982), triazine (Badr,1983) and Maleic hydrazide (Marcano *et al*, 2004), and lead salts (Wierzbicka 1994) on mitotic activity of the root meristem of onion. Both, the concentration of the compound used and duration of exposure of the growing root tips to the chemical used affects mitotic index inducing various chromosomal abnormalities.

E. coli, a gram negative bacteria, which differs from mammalian cells in uptake, metabolism, chromosome structure and DNA repair processes. It is the most sensitive to environmental stresses including temperature and the water contaminants involved (e.g., groundwater, surface

water, or treated distribution water). Fresh cultures of bacteria need be grown up to the late exponential or early stationary phase of growth (approximately 10^9 cells per ml).

Potential of this work: The results of this study will be useful to environmental regulatory agencies in i) developing *A.cepa* assay and ii) *E.coli* as a useful tool in detecting the presence and action of mutagenic agents in industrial effluents discharges. Therefore this will set pace for toxicity identification evaluation (TIE) studies of industrial effluents found to be mutagenic.

Test agents

i) food additive (*sodium benzoate*),

ii) synthetic drug (*cycloheximide, cyclophosphamide*),

iii) crude oil fractions (*engine oil and petrol*),

iv) herbicide (*isoproturon*)

v) Effect of extracts of medicinal plants will be assessed as therapeutic agents

Test Assays: The following parameters are to be studied :

1. **Calculation of Mitotic Index and % Change in mitosis index** (inhibition and promotion)

2. **Preparation of the karyotypes**

3. **Studying chromosomal abnormalities** such as chromosomal fragmentation, increase in chromosomal number

4. **Growth Kinetics of *E.coli*** in the presence of mutagens

5. **Genotoxicity assay** will be done by the following methods

   a) SOS Chromotest , b) Single cell gel electrophoresis assay (Comet assay)

Budget

A) Equipment/Consumables

Laminar Flow Vertical hood	Rs 90,0000/-
Photomicroscope & Camera Lucida	Rs 1,10,000/-
Consumables	Rs. 1,00,000/-

Total = Rs 3 lakh

B) Travel local	**Rs 1 lakh**
C) Stipend	**Rs 1,20,000/-**
D) Honorarium	**Rs 25,000/-**
E) Stationery/Printing	**Rs 1 lakh**
F) Contigency	**Rs 1 lakh**
G) Seminar/Final presentation	**Rs 1 lakh**
Grand Total =	**Rs 8,45,000/-**

Justification for Equipment:

i) **Vertical Laminar Hood** is essential to the entire project as it is required for working in a aseptic environment so that the students are aware of 'Good Lab Practices' and learn to use microbial cultures without any harm to them. A vertical Laminar hood with a high efficiency bacteria-retentive filter is essential. The HEPA filter that removes nearly all of the bacteria from the air is requisite.

ii) Photomicroscope & Camera Lucida :

Photomicroscope: Since the present study involves analysis of morphology of the chromosome and mitotic stages, a microscope with high resolution and facility to photograph the mitotic stages is essential.

Camera Lucida brings the microscope image and the drawing paper and pencil in the same plane. And the morphology of the chromosomes can be recorded for preparation of karyotypes.

Justification for Consummables. The work requires very good quality biochemicals and the best available grade of tissue culture media, antibiotics and reagents for carrying out microbial experiments. Various medicinal plants and drugs, etc. are required. Plastic ware should also be good quality so as to maintain the various cultures.

Justification for travel budget. This amount will be used to collect samples from industrial effluents. This money will also be used by students to attend seminars/ symposia within the country.

Justification for Contingencies. This amount will be used for defraying publication costs of papers, reprography and photography, as well as for purchase of spares and to bear repair costs. This amount will also be used to pay the annual maintenance contract charges for the equipment once the warranty period elapses.

References

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5. Wierzbicka M., Environmental and Experimental Botany, Vol.34, issue 2, 1994, p 173-180.

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8. Badr A., T.T.Elkington, Environmental and Experimental Botany, Vol.22, issue 3, August 1982, p. 265-270.

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10. Marcano L., I. Carruyo, A.Del Campo, X.Montiel, Environmental Research, Vol.94, issue 2, 2004, p.221-226.

Department of Botany :

i) Dr Manju A. Lal
Associate Professor

ii)Dr Renu Kathpalia
Associate Professor

Department of Zoology: i) Dr Anita Kamra Verma,Associate Professor