3.1.1

Grants received from Government and non-governmental agencies for research projects, endowments, Chairs in the institution during the last five years (INR in Lakhs)

Refer to Rifel Fumnadasc

All communications are to be addressed to the Joint Secretary by designation and not by name

ज्ञान-विज्ञान विमुक्तये

UNIVERSITY GRANTS COMMISSION
EASTERN REGIONAL OFFICE
LB 8 Sector III Salt Lake, Kolkata 700 098
Phone : (033) 2335 4767
Fax : (033) 2335 0586

No. F.PHW-034/15-16 (ERO)

To

The Principal,
Ramananda College
Bishnupur, Bankura
West Bengal-722 122

Subject : Approval of financial assistance to Dr./Mr./Ms Dr. Mousumi Mukhopadhyay (Patra), Department of Economics of your college for Minor Research Project regarding.

Sir/Madam,

1. The University Grants Commission has approved the proposal of Minor Research Project mentioned hereinabove as per the recommendations of the Expert Committee and has also approved an allocation of ₹ 235000/- for the project as per details given below :

Non-Recurring Items :	**Amount (In ₹)**
Books and Journals	10000/-
Equipment	75000/-
Recurring Items :	
Travel and Field Work	110000/-
Hiring Services	0/-
Chemicals and Consumables	0/-
Contingency (including special needs)	40000/-
Total :	**235000/-**

2. The terms and conditions of the grant will be as per the Guidelines of the scheme.
3. A sanction letter (100% of non-recurring and 50% of recurring grant) is enclosed herewith.
4. The college is requested to submit 'Acceptance Certificate' duly signed by the Principal and The Principal Investigator after receiving this letter.
5. The date of implementation will be the date of receipt of the first instalment by the college and it may be intimated in the Acceptance Certificate. The tenure of the Project will be for two years for all subjects.

Yours sincerely,

(Dr. Mohammad Arif)
Joint Secretary

Copy forwarded for information & necessary action to;
1. The Registrar, Burdwan University.
2. The Director, Higher Education, Government of West Bengal state, state Secretariat,
3. Dr./Mr./Ms Dr. Mousumi Mukhopadhyay (Patra), department of Economics
4. Guard File

(Vinod Sharma)
Under Secretary

TPK- 2016-17 -809

UNIVERSITY GRANTS COMMISSION
EASTERN REGIONAL OFFICE
LB 8 Sector III Salt Lake, Kolkata 700 098

ज्ञान-विज्ञान विमुक्तये

No. PHW-034/15-16 (ERO) ID No. WB1-066 Date: 25-Jan-17

The Accounts Officer/DDO
University Grants Commission
Eastern Regional Office, Kolkata 700 098

S.No. 228258

Sub : Release of Grant-in-Aid under the Scheme of Minor Research Project in Humanities & Social Scie during 12th Plan in the year 2016-17 to Ramananda College

Sir/Madam,

I am directed to convey the sanction of the Commission for payment of Rs. 160000
towards the scheme **Minor Research Project in Humanities & Social Sci**
to the Principal, **Ramananda College**
for the Plan expenditure to be incurred during the current financial year as per details given below:

Purpose of the grant **Dr.M. Mukhopadhyay (Patra), Econo** **1st instalment**	Approved allocation (Rs.)	Amount already sanctioned (Rs.)	Amount being sanctioned now (Rs.)	Total grant released including Gen/SC/ST component (Rs.)
MRP-Non-Recurring	85000	0	85000	85000
MRP-Recurring	150000	0	75000	75000
		Total	160000	

Component-wise total grants released to the College now:
SC:Rs. 0 ST:Rs. 0 General:Rs. 160000 Total:Rs. 160000

Accordingly I am to further inform that:

A.	**SC component: 16% (3B-2202.03.789.27.01(SC):Rs.**	0
B.	**ST component:8%, (3C-2202.03.796.28.01(ST):Rs.**	0
C.	**General component (including Minorities):76% or 100% (3A-2202.03.102.02.1(General):Rs**	160000

2. The sanctioned amount is debitable to Head of account as mentioned above and valid for payment by Accounts Officer, UGC-ERO, Kolkata to the College during the financial year 2016-17 only.
3. The amount of the grant shall be drawn by the Accounts Officer (Drawing and Disbursing Officer), University Grants Commission on the Grant-in-Aid bill and shall be disbursed to and credited to grantee as above through Electronic mode through PFMS portal at the following details:
   (a) Details (Name & Address) of Account Holder:
   Principal, **Ramananda College**

   Bishnupur, Bankura

   West Bengal 722 122

   (b) Account No.: 426210100008906 (c) IFSC Code : BKID0004262

   (d) Name & Address of Branch: Bank of India, Bishnupur, Bankura

You are requested to confirm the receipt of the above amount in your account by sending back the enclosed stamped receipt within 7 days.

4. The grant is subject to the adjustment on the basis of Utilisation Certificate in the prescribed proforma submitted by the University/College/Institution.
5. The University/College shall maintain proper accounts of the expenditure out of the grant which shall be utilised only on approved items of expenditure
6. The University/Institution may follow the General Financial Rules, 2005 and take urgent necessary action to amend their manuals of financial procedures to bring them in conformity with GFRs,2005 and those don't have their own approved manuals on financial procedures may adopt the provisions of GFRs, 2005 and instructions/Guidelines there under from time to time.
7. The Utilisation Certificate to the effect that the grant has been utilised for the purpose for which it has been sanctioned shall be furnished to the University Grants Commission as early as possible after the closing of the current financial year.
8. The assets acquired wholly or substantially out of the University Grants Commission's grant shall not be disposed or encumbered or utilised for the purpose other than those for which the grant was given, without proper sanction of the University Grants Commission.
9. A register of assets acquired, wholly or substantially out of the grant shall be maintained by the University/College in the prescribed form.

GOVERNMENT OF WEST BENGAL

Science & Technology and Biotechnology DEPARTMENT

Tel:

Fax:

Memo No 232(Sanc)/ST/P/S&T/16G-32/2018 Date: 20/02/2019

Sanction Order for Grant-in-Aid

Demand No 70 Department Code : BS Financial Year : 2018 - 2019

1. Sanctioning Authority: Science & Technology and Biotechnology
2. Name of the Grantee Institution: Ramananda College
3. Address of the Grantee Institution: Bishnupur, Bankura-722122
4. Category of Grantee Institution: Education Institution
5. Amount Sanctioned: 244400 (in words Rs. Two Lakh Forty Four Thousand Four Hundred Only.)
6. Name of the DDO: Registrar, Science & Technology & Biotechnology Dept.
7. Department Code: BS-Science & Technology and Biotechnology
8. Name of the Treasury/PAO:Pay & Accounts Officer-III, PAO-III
9. Nature of Grant (a) Recurring or Non-recurring: Recurring
   (b) Capital or Revenue: Revenue
10. Condition of Grant Utilisation Certificate required: Yes
11. Category of Grant : Education Institution
12. Purpose of Grant : Study of multistability of discrete neuronal model
13. An amount of Rs 244400 is hereby allotted for this period in favour of the Registrar, Science & Technology & Biotechnology Dept. From the head of account 3425-60-200-00-010-31-02-V from the budget provision of the financial year,2018 - 2019 under Demand No.70 Department Code BS and payable to Grantee Institution or by A/c payee cheque/By-Transfer Credit / ECS.
14. Head of Account Code :3425-60-200-00-010-31-02-V
15. Name of the Scheme :Financial Assistance to other Scientific Bodies for undertaking Scientific Projects/Surveys/Research/Training and Science Awareness & Science Popularisation programme
16. The amount will be drawn in T.R. from No.31.
17. The sanctioned amount will be payable to Ramananda College by Transfer Credit to the Head of Account of the LF/PL/Deposit Account of the Grantee Institution or by A/C payee Cheque / ECS as applicable.
18. Remarks: Present release Rs. 7,60,800/- is the 1st installment of the total project cost of Rs. 2,44,400/- sanctioned or 3 year(s) work, will be transferred through e-pradan system to Ramananda College, A/C No. 10617702224 (Current), IFSC CODE- SBIN0000044, Mobile no. 7797849111.
19. Total released amount is within the Budget Provision of the above mentioned head of account during 2018 - 2019
20. This order issues in exercise of the power delegated under Finance Department Memo. No. 1872-F.B dated-26.03.20 1259-F.B. dated-29.11.2018 & 1260-F.B dated-29.11.2018with the concurrence of Finance Deptt. vide Gr. F.A. Branch U. No. 229 F.A./Education Date 15/02/2019

DEBASHIS DAS, W.B.S.S.
Assistant Secretary
Government of West Bengal
Department of Science &
Technology and Biotechnology

Memo No. 232(Sanc.)/ST/P/S&T/16G-32/2018 Memo Date 20/02/2019

Copy forwarded for information and necessary action to:-

1. The Principal Accountant General (A&E), Treasury Buildings, Kolkata-700001
2. The Principal Accountant General (Audit), Treasury Buildings, Kolkata-700001
3. The Principal Accountant General (Receipt, Works &Local Bodies Audit),CGO Complex at Salt Lake Kolkata-700091
4. Registrar, Science & Technology & Biotechnology Dept
5. Pay & Accounts Officer-III, PAO-III
6. PSO
7. Shri Soumyajit Mukherjee, SSO
8. Principal, Ramananda College,Bishnupur, Bankura-722122
9. Dr. Mohammad Ali Khan, P.I. of the project,Ramananda College,Bishnupur, Bankura-722122 (Strickly follow Annexure-A)
10. Guard File

ASSISTANT SECRETARY

Government of West Bengal
Department of Science & Technology and Biotechnology
"Vigyan Chetana Bhavan", Salt Lake,
DD 26/B, Sector-I,
Kolkata - 700064.

Annexure-A

File No.: ST/P/S&T/16G-32/2018
Name of the P.I. with Institute: Dr. Mohammad Ali Khan, P.I. of the Project, Ramananda College, Bishnupur, Bakura.
General Guideline must be followed by the P.I.:

1. The selection of JRF/SRF shall be made as per guidelines of this Deptt. (Science & Technology).
2. The remuneration to the JRF/SRF & project Asstt. Should be disbursed as per FD Memo No. 6261-F(Y) dt. 27.06.2011.
3. Follow FD Memo No. 5400-F(Y) dt. 25.06.2012 and Memo No. 3060-F(Y) dt. 11.06.2014 where applicable.
4. The UC along with the audited statement of expenditure should be obtained within prescribed time limit / before release of further installment of grant.
5. Follow the Budget break-up given below:

SUMMARY (in Rupees)

budget break-up:

	Item of expenditure	1st year in rupees	2nd year in rupees	3rd year in rupees	Total in rupees
A	Non-recurring permanent equipment:				
	None	Nil	Nil	Nil	Nil
B	Recurring :				
	Remunerations / salaries of One Junior Research Fellow @ Rs 18700/- per month { Basic Rs 16000/- + H.R.A Rs 2400/- + M.A Rs 300/-} for 1st and 2nd Year. @ Rs 21000/- per month for 3rd year as Senior Research Fellow { Basic 18000/- + H.R.A Rs 2700/- + M.A Rs 300/-}	224400	224400	252000	700800
	consumable	Nil	Nil	Nil	Nil
	Travel	10000	10000	10000	30000
	Other Cost	10000	10000	10000	30000
	Grand Total (A+B)	244400	244400	272000	760800

Assistant Secretary to the Govt. of West Bengal

Government of West Bengal
Department of Science & Technology and Biotechnology
Bigyan Chetana Bhavan, Salt Lake,
DD- 26/B, Sector- I
Kolkata- 700064

No : 1347 /ST/P/S&T/16G-32/2018 Date : 19.03.2019

CORRIGENDUM

In continuation of this Deptt.'s sanction Order for Grant-in Aids no. **232(Sanc.)/ST/P/S&T/16G-32/2018** Dt. **20/02/19,** I am directed to inform all concerned that at the first page of the said G.O. the no. 18 points to be read as :

Present release Rs. 2,44,400/- is the 1st installment of the total project cost of Rs. 7,60,800/- sanctioned for 3 year (S) work, will be transferred through e-Pradan system to Ramananda College, A/C NO.10617702224(Current), IFSC CODE-SBIN0000044, Mobile No. 7797849111(P.I.).

Sd/-
Assistant Secretary to the Govt. of West Bengal

No : 1347 /1(10)/ST/P/S&T/16G-32/2018 Date : 19.03.2019

Copy forwarded for information and necessary action to :-

1. The Principal Account General (A&E), Treasury Buildings, Kolkata-700001.
2. The Principal Account General (Audit), Treasury Buildings, Kolkata-700001.
3. The Principal Account General (Receipt, Works & Local Bodies Audit), CGO Complex at Salt Lake, Kol-700091.
4. Registrar, Science & Technology & Biotechnology Deptt. .
5. Pay & A/Cs Officer- III, PAO-III.
6. PSO.
7. Shri Soumyajit Mukherjee, SSO.
8. Principal, Ramananda College ,Bishnupur, Bankura-722122.
9. Dr. Mohammad Ali Khan, P.I of the project, Ramananda College ,Bishnupur, Bankura-722122.
10. Guard File.

Assistant Secretary to the Govt. of West Bengal

RAMANANDA COLLEGE

BISHNUPUR * BANKURA

Pin – 722122, West Bengal

UGC Recognized & State Government Aided Constituent College

Under Bankura University

(Accredited by NAAC at 'B' Level)

Tel - (03244)252059

Tele Fax – (03244) 254427

e-mail–principal@ramanandacollege.org

Website-www.ramanandacollege.org

Ref. No. 542 / B / 2019 **Date- 08-04-2019**

To
Dr. Subhankari Prasad Chakroborty
Assistant Professor of Physiology
Department of Physiology
Ramananda College
Bishnupur, Bankura
&
Mrs. Rudrani Mukherjee
Govt. Approve Part-time Teacher
Department of Physiology
Ramananda College
Bishnupur, Bankura

Sub : Approval of financial assistance to the Principal Investigators of Minor Research Project (College) on "In Victro Study Of Possible Protective Role of Catheranthus roseus L. against smokeless tobacco induced toxicity in squamous epithelium cell".

Sir/Madam,

The Research Committee in its meeting held on 25-03-2019 in the presence of honourable members of the Governing Body has approved your proposal of Minor Research Project (involving students) and has also approved an allocation of Rs. 10,000 (Rupees ten thousand) as the 1st installment of the proposed sanction [total sanction Rs. 15,000 (Rupees fifteen thousand)]. The rest of the financial grant will be disbursed after six months on submission of a brief progress report of the project.

Thanking you

Yours faithfully,

8/4/19

(Dr. Swapna Ghorai)
Principal
Ramananda College
Bishnupur, Bankura

Principal
Ramananda College,
Bishnupur, Bankura

Title of the Project: *In Vitro* study of possible protective role of *Catharanthus roseus* L. against smokeless tobacco induced toxicity in squamous epithelium cell.

Principal Investigator: Dr. Subhankari Prasad Chakraborty, Assistant Professor, Department of Physiology, Ramananda College, Bishnupur, Bankura, Pin-722 122.

Co-investigator: Mrs. Rudrani Mukherjee, Govt. approved Part-Time Teacher, Department of Physiology, Ramananda College, Bishnupur, Bankura, Pin-722 122.

India is the second largest producer and third largest consumer of tobacco in the world (Reddy and Gupta, 2004). According to GATS India Report (2009-10) those using SLT only (163.7 million) are more than double of those who are exclusive smokers (42.3 million). The focus on SLT control policies should be strengthened as its use has increased from 28% by men and 12% by women in NFHS-2 (1998-99) to 33% by males and 18% by females in 2009-10. This is alarming, as the increase in use is despite implementation of population level legislative measures (GATS, 2009). SLT has been associated with oral cancer for many decades. Oral SLT contains numerous carcinogens, including polonium 210, tobacco-specific *N*-nitrosamines, volatile aldehydes, and polycyclic aromatic hydrocarbons (Walsh and Epstein, 2000).

Squamous epithelium cells are the first line of defense, and play a central role in the inflammation and immune responses. These immune cells are highly susceptible to oxidative damage due to the presence of high percent polyunsaturated fatty acids in their plasma membrane and generation of reactive oxygen species through respiratory burst, which is their important biological function. But, an excess amount of reactive oxygen can attack cellular components and lead to cell damage.

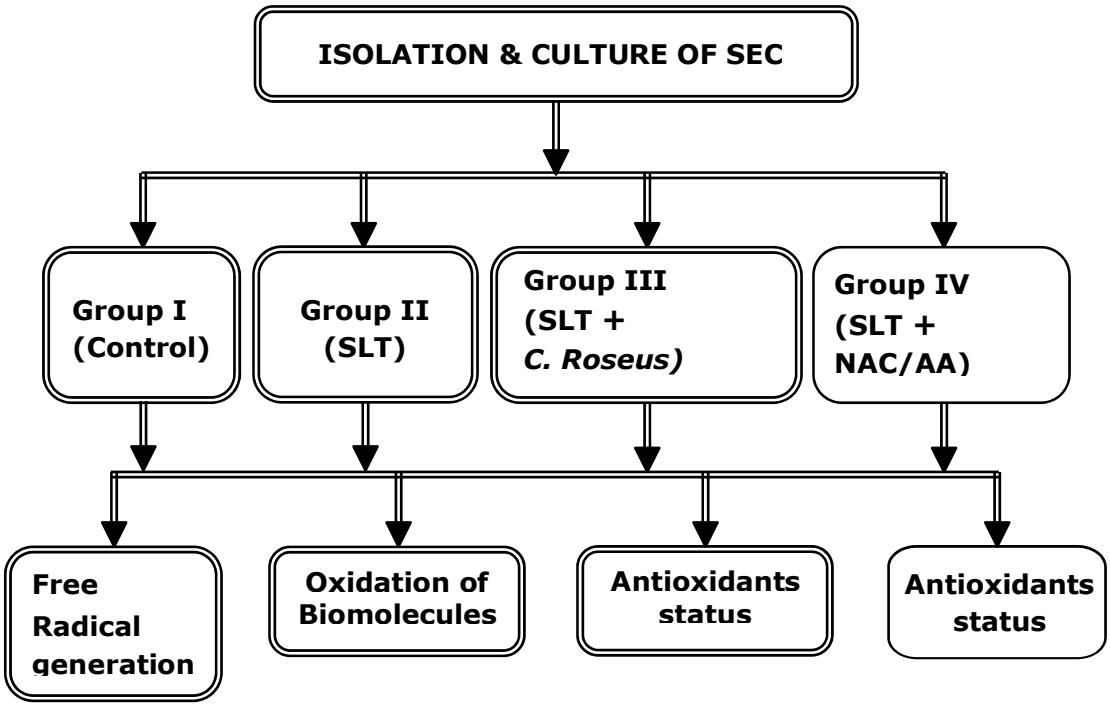
Medicinal plants are the main source of bioactive compounds. Bioactive compounds have extra health benefits that promote and maintain consumers' health and prevent chronic illnesses, which are the main topics of discussion nowadays. Traditionally medicinal plants have been in routine use in the treatment of several human diseases. This property is mainly due to the presence of phytochemicals which are classified as primary and secondary compounds (Aslam and Ahmed, 2016). *Catharanthus roseus* L. contains significant amounts of phenolic and volatile compounds, including flavonol glycosides and caffeoylquinic acids, which are known for antioxidant activity. It has an important role in the body defense system in acting as antioxidants against reactive oxygen species (ROS), which are unsafe, by forming such goods through normal cell aerobic respiration (Kaur and Mondal, 2014).

In view of the importance of squamous epithelium cell in immune system, toxic effects of SLT, and the beneficial role of the *Catharanthus roseus* Linn, investigation was carried out with the following objectives,

- ✓ To find out the role of free radical scavenging activity, and antioxidant power of aqueous extracts, methanol extract and ethanol extract of *Catharanthus roseus* L. using *in vitro* models.
- ✓ To examine the modulation of cellular functions of squamous epithelium cell during smokeless tobacco induced oxidative stress.
- ✓ To determine whether smokeless tobacco induced toxicity in squamous epithelium cell could be ameliorated by the administration of *Catharanthus roseus* L.

SCHEMATIC REPRESENTATION
OF
THE PROPOSED INVESTIGATION

NAC = *N*-acetylcysteine; AA = Ascorbic acid; *C.roseus* = *Catharanthus roseus* Linn.



In the present study, experiments were carried out to observe SLT-induced toxicity in squamous epithelium cell using in vitro methodologies. Simultaneously, we have prepared aqueous extract (Ae-Cr) and methanol extract (Me-Cr) from the aerial part of *C. roseus*. Possible ameliorative property of these herbal products was also tested against SLT-induced oxidative stress in squamous epithelium cell.

Our results established that, the aqueous extract and methanol extract of aerial part of *C. roseus* has potent free radical scavenging activity and antioxidant property; as these herbal products have 1,1-Diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity, hydroxyl radical (in Fe^{3+}/ascorbate/EDTA/H_2O_2 system) scavenging activity, nitric oxide (in aqueous solution of sodium nitroprusside) scavenging activity, antioxidant activity (ferric thiocyanate method), and the reducing power in concentration-dependent fashion. These properties of *C. roseus* may be replicated in biological system to fight against free radical mediated oxidative disorders. Hence, these two extracts

(Ae-Cr, Me-Cr) can be used as therapeutic agents during SLT-induced toxicity. Moreover, the plant may be introduced in ethno-pharmacological industry to develop various herbal antioxidants.

To investigate the SLT-induced oxidative damage in squamous epithelium cell, toxicity-related biochemical parameters were studied in the present work. To determine the maximum effect of SLT in squamous epithelium cell, we have studied concentration and time-dependent experiments. In this experiment, five different concentration of SLT (1 mg, 5 mg, 10 mg, 25 mg, and 50 mg) with cell culture media was tested to observe the effective concentration, and followed by time-dependent study was carried out for several timescale starting from 3 h upto 24 h, having 3 h interval each. The present study clearly established that, in vitro SLT induces oxidative damage in squamous epithelium cell; evidenced by enhancing superoxide anion generation, lipid peroxidation, protein oxidation, and diminishing antioxidant defense system at concentrations and time-dependent study. In the concentrations-dependent study, the alterations of different parameters (except oxidized glutathione and glutathione reductase) were being first significantly detected in 1 mg SLT-induced squamous epithelium cell, compared to control, with a plateau being observed in 10 mg SLT-induced squamous epithelium cell. The superoxide anion generation was observed highest, and reduced glutathione level, superoxide dismutase, glutathione peroxidase, and glutathione reductase activity were also decreased maximum in 10 mg SLT-induced squamous epithelium cell. Lipid peroxidation (in terms of malondialdehyde), protein oxidation (in terms of protein carbonyl), and oxidized glutathione level were increased, and glutathione reductase activity was decreased maximum in 25 mg SLT-induced squamous epithelium cell. Only catalase activity was decreased extreme in 50 mg SLT-induced squamous epithelium cell. Besides that, during time-dependent study, the alterations of these parameters were being first significantly observed after 3 h SLT exposure compared to control, but a plateau being noticed after 12 h treatment. The alterations of superoxide anion generation, lipid peroxidation level, protein oxidation level, and glutathione peroxidase activity were found highest at 12 h, and the rest parameters were altered maximum in different time interval. Hence, it may be concluded that, in vitro administration of 10 mg SLT concentration for 12 h can produce the highest degree of damage in squamous epithelium cell. We have followed this concentration (10 mg), and duration (12 h) of SLT exposure for the next series of experiments.

Then, we have designed the experiment to examine the ameliorative effect of two plant products (Ae-Cr, Me-Cr) on cellular damage through evaluating the free radical generation, lipid-protein damage and antioxidant status during SLT-induced toxicity in squamous epithelium cell in comparison to the potential antioxidant, *N*-acetylcysteine and ascorbic acid.

To establish the non-toxic concentration, the cytotoxic effect of the Ae-Cr and Me-Cr was studied in squamous epithelium cell with increasing concentrations ranging from 0.1 µg/ml to 100 µg/ml, using the 3-(4, 5-dimethylthiazol-2-yl)-2, 5 diphenyl tetrazolium bromide (MTT) method. Our results indicated that, treatment of squamous epithelium cell with 10 µg/ml of Ae-Cr and 25 µg/ml of Me-Cr for 48 h led to 87.89% and 88.59% viable cells, respectively. But, there was no significant difference in cell survivability below these concentrations of the corresponding herbal products.

Hence, these are the highest concentrations of Ae-Cr and Me-Cr, which does not produce any significant damage to normal squamous epithelium cell. Hence, 10 µg/ml of Ae-Cr and 25 µg/ml of Me-Cr are the non-toxic concentration.

To study the maximum protection, we have used different concentration of Ae-Cr (1, 5, 10, and 25 µg/ml), Me-Cr (1, 5, 10, and 25 µg/ml), and *N*-acetylcysteine (0.25, 0.5, 1, 2, and 5 µg/ml) against 10 mg SLT in squamous epithelium cell. A concentration-dependent protective effect was observed with all concentrations of Ae-Cr, Me-Cr, and *N*-acetylcysteine, as evidenced by decreased level of superoxide anion generation and malondialdehyde, and also increased reduced glutathione level and superoxide dismutase activity. Moreover, maximum protection was observed at the concentration of 10 µg/ml Ae-Cr, 25 µg/ml Me-Cr, and 1 µg/ml *N*-acetylcysteine (0.006 nM).

Further, experiments were carried with these products with their non-toxic effective concentrations against SLT (10 mg) toxicity by analyzing the radical generation, lipid-protein damage, and endogenous antioxidant status, as those are the indicator of free radical mediated cellular damage. Our results indicated that, SLT-induced cellular damage in squamous epithelium cell was effectively ameliorated by supplementation of Ae-Cr (10 µg/ml), Me-Cr (25 µg/ml), *N*-acetylcysteine (1 µg/ml; 0.006nM), and ascorbic acid (0.01 mM). Hence, these herbal products (Ae-Cr and Me-Cr) may be useful as a potent free radical scavenger antioxidative product, and may be a potential therapeutic agent against SLT toxicity like potent antioxidants, *N*-acetylcysteine and ascorbic acid.

Hence, these findings suggested that, SLT can induce oxidative stress, and ultimately may provoke to apoptosis in squamous epithelium cell. Additionally, herbal products of *Catharanthus roseus* may be useful as a potent free radical scavenger, and may be a potential therapeutic agent against SLT-induced toxicity, like potent antioxidants, *N*-acetylcysteine, and ascorbic acid.

References:

Aslam MS, Ahmad MS. Worldwide importance of medicinal plants: current and historical perspectives. Recent Adv Biol Med. 2016; 2: 88-93.

Kaur S and Mondal P. Study of total phenolic and flavonoid content, antioxidant activity and antimicrobial properties of medicinal plants. J Microbiol Exp. 2014; 1(1): 1-6.

Reddy KS, Gupta PC, editors. Report on Tobacco Control in India. Ministry of Health and Family Welfare. New Delhi, India; 2004.

Walsh PM and Epstein JB. The oral effects of smokeless. J Can Dent Assoc. 2000; 66: 22-25.

Subhankari prasad Chakraborty

Signature of Principal Investigator

26/11/2020

Principal
Ramananda College
Bishnupur, Bankura

RAMANANDA COLLEGE ESTD.-1945 (BANKURA) BISHNUPUR

Government of West Bengal
Department of Higher Education, Science & Technology and Biotechnology
"Vigyan Chetana Bhavan", Salt Lake,
DD 26/B, Sector-I,
Kolkata – 700 064.

Annexure – A

File No.:BT/ST/P/S&T/2G-30/2017
Name of the P.I. with Institute: Dr. Indrani Chandra, University of Burdwan.
General Guideline must be followed by the P.I.:

1. The selection of JRF/SRF shall be made as per guidelines of this Department (Biotechnology).
2. The remuneration to the JRF/SRF & Project Asstt. Should be disbursed as per FD Memo No. 6261-F(Y) Dt. 27/06/2011.
3. Follow FD Memo No. 5400-F(Y) Dt. 25/06/2012 and Memo No. 3060-F(Y) Dt. 11/06/2014 where applicable.
4. The UC along with the audited statement of expenditure should be obtained within prescribed time limit/before release of further instalment of grant.
5. Follow the Budget break-up given below:

SUMMARY (In Rupees)

Item	BUDGET			
	1st Year	2nd Year	3rd Year	Total
A-Non-recurring Permanent equipment	399440.00	0.00	0.00	3,99,440
B-1 Manpower (Rs. Lakh)	224400.00	224400.00	252000.00	7,00,800
B-2 Consumables (Rs. Lakh)	1,00,000	1,30,000	50,000	2,80,000
B-3 Travel and contingency (Rs. Lakh)	10,000	5,000	5,000	20,000
B-4 Other costs	33,000	33,000	33,000	99,000
Total (A+B)	7,66,840	3,92,400	3,40,000	14,99,240
Overhead cost if applicable @ 10%	-	-	-	-
Grand Total (A+B)				14,99,240

Officer on Special Duty

O.S.D. & Ex-officio Dy. Secretary
Deptt. of Higher Education Science & Technology and Biotechnology

Annexure-II

ENDORSEMENT FROM THE HEAD OF INSTITUTION

(TO BE GIVEN ON LETTER HEAD)

Project Title: **Cultivation of disease free *Fragaria vesca* through Plant Tissue Culture and study of its bioactive compounds**

1. Certified that the Institute welcomes participation of **Dr. Indrani Chandra** as the Principal Investigator and **Dr. Sabyasachi Chatterjee** as the Co-Investigator for the project and that in the unforeseen event of discontinuance by the Principal Investigator, the Co-Investigator will assume the responsibility of the fruitful completion of the project (with due intimation to DHESTBT, GOWB).

2. Certified that the equipments, other basic facilities and such other administrative facilities as per terms and conditions of the grant, will be extended to investigator(s) throughout the duration of the project.

3. Institute assumes to undertake the financial and other management responsibilities of the project.

09.06.17

Name and Signature of Head of Institution

REGISTRAR
UNIVERSITY OF BURDWAN
RAJBATI, BURDWAN
WEST BENGAL, INDIA

Date: 9.6.2017
Place: Burdwan

Remarks:

In regard to research proposal emanating from scientific institutions/laboratories under various scientific Departments, the Head of the Institution is to provide a justification indicating clearly whether the research proposal falls in line with the normal research activities of the institution or not, and if no, the scientific reasons which merit its consideration by Department of Higher Education, Science and Technology & Biotechnology, Government of West Bengal.

RAMANANDA COLLEGE

BISHNUPUR * BANKURA

Pin – 722122, West Bengal

UGC Recognized & State Government Aided Constituent College

Under Bankura University

(Accredited by NAAC at 'B' Level)

Tel - (03244)252059

Tele Fax – (03244) 254427

e-mail–principal@ramanandacollege.org

Website-www.ramanandacollege.org

Ref. No. 540 / B / 2019 **Date- 08-04-2019**

To
Mr. Parnab Chatterjee
Librarian
Central Library
Ramananda College
Bishnupur, Bankura
&
Mrs. Shrabani Karak
Librarian
Central Library
Ramananda College
Bishnupur, Bankura

Sub : Approval of financial assistance to the Principal Investigators of Minor Research Project (College) on "Bibliometric Analysis Of The Faculty Publications Of Ramananda College During The Year 2008-2018".

Sir/Madam,

The Research Committee in its meeting held on 25-03-2019 in the presence of honourable members of the Governing Body has approved your proposal of Minor Research Project (involving students) and has also approved an allocation of Rs. 7,000 (Rupees seven thousand) as the 1st installment of the proposed sanction [total sanction Rs. 10,000 (Rupees ten thousand)]. The rest of the financial grant will be disbursed after six months on submission of a brief progress report of the project.

Thanking you

RAMANANDA COLLEGE ESTD.-1945 (BANKURA) * BISHNUPUR *

Yours faithfully,

8/4/19

(Dr. Swapna Ghorai)
Principal
Ramananda College
Bishnupur, Bankura

Principal
Ramananda College,
Bishnupur, Bankura

Institution minor project report (April, 2019 - March, 2020)

Funding Institution: Ramananda College, Bishnupur, Bankura

Title of the project: Bibliometric analysis of the faculty publications of Ramananda College during the year 2008 – 2018.

Principal investigator: Parnab Chatterjee and Srabani Karak, Librarian, Central Library, Ramananda College.

Students involved: Nil.

Objective:

1. To explore and gauge the research productivity of Ramananda Collge for last ten years;
2. To trace the research trend in different subject fields;
3. To analyze the publication trend as indexed by WOS and Google scholar, the world's largest abstract and citation database of peer-reviewed literature.

Abstract:

Biblio means book and metric means a scale or measure. Bibliometric means application of statistical studies in library and information science. The term bibliometric was first used by Alan Pritchard in his article Statistical bibliography or bibliometric in 1969 published in the Journal of Documentation.

Selected Database:

1. *SCOPUS* (http://www.scopus.com), founded in 2004, offers a great deal of flexibility for the bibliometric user. It permits to query for different fields, such as titles, abstracts, keywords, references and so on. SCOPUS allows for relatively easy downloading data-queries, although there are some limits on very large results sets with over 2,000 items.

2. *Clarivate Analytics Web of Science (WoS)* (http://www.webofknowledge.com), owned by Clarivate Analytics, was founded by Eugene Garfield, one of the pioneers of bibliometrics.
   This platform includes many different collections.

3. *CDSR* (http://www.cochranelibrary.com/cochrane-database-of-systematic-reviews/index.html) is the leading resource for systematic reviews in health care. The CDSR includes Cochrane Reviews (the systematic reviews) and protocols for Cochrane Reviews as well as editorials. The CDSR also has occasional supplements. The CDSR is updated regularly as Cochrane Reviews are published "when ready" and form monthly issues; see publication schedule.

4. *PubMed* comprises more than 28 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher websites.

Methodology:

Scientometrics analysis will be carried out contributions of the faculties of ramananda College. A scientometics study deals with the bibliographical study of the individual careers of scientists and researchers and correlates the bibliographical analysis of publications with their academic / scientific achievements. It is a scientific field that studies the evolution of science through some quantitative measures of scientific information, as the number of scientific articles published in a given period of time, their citation impact, etc. The history of science and technology, philosophy of science and sociology of scientific knowledge are the related fields of Scientometrics.

Scientometrics research includes studies related to the scattering & growth of literature, author productivity, obsolescence of documents, distribution of scientific literature by country, by language, etc, which helps to monitor the growth & pattern of research.

Result:

This project collects citation data from Scopus and WOS database. Out of 54 teachers 4 teacher's publications are analysed by Bibliometrix package in R Statistical software.

The data of Annual Scientific Production, Most Productive Author's, Author Coupling, Average Total Citations per Year, Co- Citation Network, and Keyword Co-occurrences collected from WOS database.

A paper named "Bibliometrics analysis: An introduction to the one of the faculty member of Ramananda College." published in the Frontiers in multidisciplinary research (FMR) journal.

Conclusion:

This study is helpful to enlighten the different knowledge domains of the faculty members of Ramananda College. Bibliometric studies can be a source of inspiration and productivity for the young professionals.

Acknowledgement:

The Principal Investigator is thankful to Institution (Ramananda college, Bishnupur, Bankura) for funding of this project.

Bibliographical References

1. Bence, V and Oppenheim C. (2004): Does Bradford-Zipf apply to business and management journals in the 2001 Research Assessment Exercise? Journal of Information Science, Vol. 30(5), pp.470-471.
2. Garfield, E. (1979): Bradford's law and related statistical patterns, Essays of an Information Scientist. Vol. 4, pp.477.
3. Heffner, AG. (1981): Funded research, multiple authorship, and sub authorship collaboration at some European universities. Scientometrics Vol.3 No. 1, pp. 5-12.
4. Jeevan, V.K. and Gupta, B.M. (2001), "Research output from IIT-Kharagpur: a scientometric analysis", *8th International Conference on Scientometrics and Informetrics. Proceedings - ISSI-2001* , Vol. 2, Pt. 2, pp. 847-849.
5. Kademani BS., Kalyane VL. and Vijai Kumar AH.(2002): Zewail: Research Collaborator par excellence, *Scientometrics*, Vol. 53, No. 1, pp. 113-121.
6. Kademani, BS., Kalyane VL. and Vijai Kumar.(2002): Scientometric Portrait of Nobel Laureate Harold W. Kroto, *SRELS Journal of Information Management,* Vol. 39, No. 4, pp. 409-434.
7. Kademani, B.S. et al., (2006), "Scientometric dimensions of thorium research in India", *DESIDOC Bulletin of Information Technology*, Vol. 26, No. 3, pp. 9-25.
8. Kademani, B.S. et al., (2006), "Scientometric dimensions of nuclear science and technology research in India: a study based on INIS (1970-2002) database", *Malaysian Journal of Library & Information Science*, Vol. 11, No. 1, pp. 23-48.
9. Kademani, B.S. et al., (2007), "Mapping of Indian publications in Scientometric analysis of publications in science citation index", *DESIDOC Bulletin of Information Technology*, Vol. 27, No. 1p.17-34.
10. Kademani, B.S., Kalyane, V.L. and Kumar, V. (2002), "Scientometric portrait of Nobel laureate Harold W. Kroto", *SRELS Journal of Information Management*, Vol. 39, No. 4, pp. 409-434.
11. Kademani, B.S., Kalyane, V.L.and Kumar, V. (2001), "Scientometric portrait of Nobel laureate Ahmed Hassan Zewail", *Malaysian Journal of Library & Information Science*, Vol. 6, No. 2, pp. 53-70.
12. Kalyane, VL, Sen, BK.(2002): Scientometric portrait of Tibour Braun, *http://tibor-braun.fw.hu* pp. 1-13
13. Mahapatra, Gayatri (2000): Bibliometric studies on Indian library & information science literature. New Delhi: Crest publishing house. pp. 2-5
14. Rao, CNR, Ed. (1983): Contributions to crystallography. Dedicated to Sivaraj Ramaseshan's on his 60th birthday. Bangalore: Indian Academy of Science, pp.
15. Sangam SL, Kiran Savanur, Manjunath M and Vasudevan.(2004): Scientometric Portrait of Peter John Wyllie, Eighth International Conference on Science and Technology Indicators, Leiden, The Netherlands 23-25 Sept.2004. Pp.181-183.

26/11/2020
Principal
Ramananda College,
Bishnupur, Bankura

Sd/ Parnab Chatterjee
Librarian, Central Library
Ramananda College
Bishnupur, Bankura

RAMANANDA COLLEGE ESTD.-1945 (BANKURA) BISHNUPUR

All communications are to be addressed to the Joint Secretary by designation and not by name

ज्ञान-विज्ञान विमुक्तये

UNIVERSITY GRANTS COMMISSION
EASTERN REGIONAL OFFICE
LB 8 Sector III Salt Lake, Kolkata 700 098
Phone : (033) 2335 4767
Fax : (033) 2335 0586

No. F.PHW-033/15-16 (ERO)

To

The Principal,
Ramananda College
Bishnupur, Bankura
West Bengal-722 122

Subject : Approval of financial assistance to Dr./Mr./Ms BINAPANI GHOSH, Department of Bengali of your college for Minor Research Project regarding.

Sir/Madam,

1. The University Grants Commission has approved the proposal of Minor Research Project mentioned hereinabove as per the recommendations of the Expert Committee and has also approved an allocation of ₹ 160000/- for the project as per details given below :

Non-Recurring Items :	Amount (In ₹)
Books and Journals	30000/-
Equipment	70000/-
Recurring Items :	
Travel and Field Work	40000/-
Hiring Services	0/-
Chemicals and Consumables	0/-
Contingency (including special needs)	20000/-
Total :	**160000/-**

2. The terms and conditions of the grant will be as per the Guidelines of the scheme.
3. A sanction letter (100% of non-recurring and 50% of recurring grant) is enclosed herewith.
4. The college is requested to submit 'Acceptance Certificate' duly signed by the Principal and The Principal Investigator after receiving this letter.
5. The date of implementation will be the date of receipt of the first instalment by the college and it may be intimated in the Acceptance Certificate. The tenure of the Project will be for two years for all subjects.

Yours sincerely,

(Dr. Mohammad Arif)
Joint Secretary

Copy forwarded for information & necessary action to;
1. The Registrar, Burdwan University.
2. The Director, Higher Education, Government of West Bengal state, state Secretariat,
3. Dr./Mr./Ms BINAPANI GHOSH, department of Bengali
4. Guard File

(Vinod Sharma)
Under Secretary

Annexure-I

UNIVERSITY GRANTS COMMISSION
FORMAT FOR SUBMISSION OF PROPOSAL FOR MINOR RESEARCH PROJECT

PART – A

1. Broad Subject: **Bangla Kabya-Kabitay Upavashar Charcha**

2. Area of Specialization: **Bangla Kabya-Kabitay Bankurar Bivinna Anchale Prachalita Anchalik Upavasha(Rarhi o Jharkhandi) ba Bankri Vashar prayog, Taur Upojogita o Gurutwa.**

3. Duration: **2 Years**

4. Principal Investigator:

i. Name: **BINAPANI GHOSH**

ii. Sex: **Female**

Iii. Date of birth: **01.07.1967**

Iv. Category: **General**

Iv. Qualification: **M.A., B.ED**

V. Designation: **Assistant Professor**

vi. Address: Office: **Ramananda College, Bishnupur, Bankura. PIN-722122**

Residence: **Machantala, Petrol Pump, P.O. & Dist.- Bankura. PIN-722101**

Email/Phone: **9474454996**

5. Name of the Institution where the project will be undertaken:

(a) Department: **Bengali**

(b) College: **Ramananda College, Bishnupur.**

(c) Affiliating University: **The University of Burdwan**

(d) Whether the institute is located in rural/backward area: **Yes**

6. Whether the College is approved under Section 2 (f) and 12 B of the UGC Act? **Yes**

7. Teaching and Research Experience of Principal Investigator:

(a) Teaching experience: UG- **15 Years 7 months**

Received
Date 30-6-15
University Grants Commission
Eastern Regional Office
Kolkata-700 073

RAMANANDA COLLEGE

BISHNUPUR * BANKURA

Pin – 722122, West Bengal

UGC Recognized & State Government Aided Constituent College

Under Bankura University

(Accredited by NAAC at 'B' Level)

Tel - (03244)252059

Tele Fax – (03244) 254427

e-mail–principal@ramanandacollege.org

Website-www.ramanandacollege.org

Ref. No. 541 / B / 2019

Date- 08-04-2019

To
Dr. Sabyasachi Chatterjee
Assistant Professor of Botany
Department of Botany
Ramananda College
Bishnupur, Bankura

Sub : Approval of financial assistance to the Principal Investigators of Minor Research Project (College) on "Phytoremediation Of Heavy Metal Pollution In Industrial Soil By Three Different Plants Allium Sativum, Allium Cepa, Brassica Nigra".

Sir,

The Research Committee in its meeting held on 25-03-2019 in the presence of honourable members of the Governing Body has approved your proposal of Minor Research Project (involving students) and has also approved an allocation of Rs. 10,000 (Rupees ten thousand) as the 1st installment of the proposed sanction [total sanction Rs. 15,000 (Rupees fifteen thousand)]. The rest of the financial grant will be disbursed after six months on submission of a brief progress report of the project.

Thanking you

Yours faithfully,

8/4/19

(Dr. Swapna Ghorai)
Principal
Ramananda College
Bishnupur, Bankura

Principal
Ramananda College,
Bishnupur, Bankura

Institution minor project report (April, 2019- March,2020)

Funding Institution: Ramananda College, Bishnupur, Bankura

Title of the project: Phytoremediation of Heavy metals in industrial area by three different plants *Allium sativum* , *Allium cepa* and *Brassica nigra*.

Principal investigator : Dr . Sabyasachi Chatterjee, Assistant Professor, Department of Botany

Students involved: 1)Mr. Soumik Chatterjee (PG 4th Semester), Department of Botany

2)Ms. Mistu karmakar (PG 4th Semester), Department of Botany

Implementing Department: PG Department of Botany, Ramananda college , Bishnupur-722122, Bankura.

Month of project commencement: April, 2019

Month of project completion: March, 2020

Project objectives :

1. *In vivo* Culture and treatment of Arsenic on *Allium sativum ,Allium cepa* and *Brassica nigra* seeds.

2. To study Arsenic affected plant parts.

3. To study which part of plants are restoring Arsenic.

Abstract :

Heavy metals are currently of high alarm environmental concern and are harmful to humans, animals and tend to bio accumulate in the food chain. Arsenic is a well known carcinogenic element, that can harm not only human health but also effect on plant and bacteria. *Allium cepa* and *Allium sativum* both belong to the family Liliaceae and *Brassica nigra* belong to the family Brassicaceae. These three plant have heavy metals uptake mechanism. The present study was designed to examine the effect of Arsenic (As) on germination, roots, stems and leafs length and also effects on cell divisions in the root meristems of germinated *Allium cepa ,Allium sativum* and *Brassica nigra*. The *A.cepa, A.sativum* and *B.nigra* seeds were germinated with in Arsenic (As) solution at three different concentrations. The mitotic index and chromosomal abnormalities are used to evaluate genotoxicity and micronucleus analysis used to verify effect of heavy metal arsenic. The results showed that these three plants have the ability to accumulate arsenic in their tissue. Heavy metal concentrations increased in roots, stems, leaves and results are compared with those of control. Replicated experiments confirmed that, Arsenic accumulates in the different tissues in different parts of the plant and adversely affects the growth and productivity of the plants. Arsenic also effects on primary, secondary metabolites of *Brassica nigra* leaves

with the increase of arsenic concentration. XRD analyses were used to determine the cristalinity of *Brassica nigra* leaves. FESEM-EDX was done to study the structural modifications and to estimate the concentration and distribution of As in roots, stems and leaves surface. The results showed that germinated *A.sativum* and *Brassica nigra* seeds has the ability to accumulate As in their tissue. *Brassica nigra* plant uptakes Arsenic upto leaf but *Allium sativum* can uptake arsenic upto root portions. The FESEM- EDX result indicates the presence of As in the roots, stems and leaves tissues of *Brassica nigra* and only root tissue of *Allium sativum*. Based on the results, the plant *Allium sativum* and *Brassica nigra* can be considered as heavy metal accumulator.

Introduction:

Contamination of sediments with heavy metals is the major environmental problem all over the world. Heavy metals pollution are usually generated through industrial processes. Arsenic (As), being a highly toxic metal pollutant of soils, inhibits root and shoot growth and yield production, affects nutrient uptake and homeostasis, and is frequently accumulated by agriculturally important crops and then enters the food chain with a significant potential to impair animal and human health[1]. Phytoremediation is used as a green technology and can be applied to both organic and inorganic pollutants present in soil water and the air. Plants such as *Brassica nigra* show high tolerance to heavy metals and therefore, are used in phytoremediation studies [2]. The finding showed that the low doses of As stimulated the root and shoot elongation of *Allium sativum*, *Allium cepa* and *Brassica nigra* and at higher concentrations significant (%) reduction in germination of these plants.

Materials and methods:

1. Soil sampling:-

1.1 Soil collection area: Soil collected from Durgapur industrial area.

1.2 Soil sampling: A V- shaped cut was made 15 to 18 Cm deep from soil surface and was taken 1 cm slice from the upper side. Soil was collected in a clean plastic bag.

1.3 Preparation of soil sample: Collected soil sample was dried, ground and sieved.

1.4 Drying: Soil sample was air dried at (25-35ºC) and at relative humidity of 20-60 % and stored.

1.5 Mixing: Soil sample was thoroughly mixed by rolling procedure. Soil dried on a piece of paper. This process repeated back in the reverse direction.

1.6 Sieving: Soil sample was prior to drying and was pass through a 6 mm sieve (about 4 mesh per inch) by rubbing with fingers.

1.7 Storing: -The soil was store in a polythene bag and was test by PUSA STFR METER.

2. *In vivo* Culture and treatment of Arsenic on *Allium sativum*, *Allium cepa* and *Brassica nigra*:-

Arsenic trioxide (As_2O_3) salt was used for arsenic source for this study. Stock solution (500 ml) of arsenic trioxide (concentration 200 ppm) was prepared, and from the stock solution, three different concentrations (20 ppm, 50 ppm, and 100 ppm) of arsenic trioxide solution were prepared. Soil was collected from industrial area and placed in four different pots (Soil 200gm) for planting of *Allium sativum* L., *Allium cepa* L. blubs and seeds of *Brassica nigra*. Then different concentrations of arsenic trioxide solution (20 ppm, 50 ppm, 100 ppm) were added (20 ml) in three different pots except the pot marked as control.

3. Cytological studies :-

Root tips were utilized for cytological investigation. Root tips from the *Allium cepa*, *Allium sativum*, *Brassica nigra* were collected between 9 am to 9.45 am .Then root tip washed with distilled water and fixed in acetic alcohol for 24 hours and then was store in 70% alcohol for subsequent use [3]. The seeds of three different plants were treated with various concentration of arsenic solution (20ppm,50ppm, 100ppm). After 7 days the root tips were taken and used for cytological studies. The root tips were collected from three different plants. After treatment, the root tips of three different plants were washed in distilled water and fixed in 1:3 acetic alcohol. Then root tip of three plant squashes were made by using iron alum, haematoxylin squash technique of Marimuthu and Subramaniam (1960) [4]. This technique was used for the cytological investigations.

4.Phytochemical Analyses:-

4.1 Extraction:-

The leaves of *Brassica nigra* was used for extraction of phytochemicals. Aqueous extraction was done.

4.1.1 Aqueous extraction of *Brassica nigra* leaf :10 gm leaves was collected from different concentrations of Arsenic treated *Brassica nigra* plant and also control plant.Then leaves were crushed in sterile mortar and pestle by adding 100 ml distilled water. Then each plant leaf extract was filtered and collected in test tube, stored at 4ºC for further process.

4.2 Phytochemical Analyses:-

The detailed phytochemical analyses was carried out for all the extracts i.e. Arsenic treated leaves of *Brassica nigra*, as per the standard methods with some of the modifications [5].

5. Antimicrobial assay:-

5.1 Agar Well Diffusion Method:

The agar well diffusion method was employed for the determination of antimicrobial activity of plant (*Brassica nigra*) leaves extract. To brief, wells are made in Mueller Hinton agar plates using cork borer (7mm diameter) and the inoculums containing 100µl of microbial strains was spread on the plates with the help of glass spreader in an aseptic condition 200µl of *Brassica nigra* extracts in each well; The plates were incubated at 37ºC for 24 hours in incubator. The diameter for the zone of inhibition was measured in millimeter (mm) [6].

6. X-RAY Diffraction analysis of *Brassica nigra*:-

The arsenic treated and untreated *Brassica nigra* leaves were cleaned and sun dried for 10 days. For these experimental purposes, 100gm dried plant leaves were put in a 3 mixer-grinder cum blender (550 watts at 17000 rpm) rotating speed electrical motor. The plant leaves were grounded and crushed well and uniformly for 15 minutes with utmost precaution to avoid any contamination and made them as nano-sized powder. The powdered materials were packed in plastic pouches and stored in normal room temperature until use. XRD analysis of the prepared sample of plant leaves was done using a X'pert PRO of PANalytical diffractometer, Cu-Kα X-rays of wavelength (λ) =1.54056 Å and data was taken for the 2θ range of 10° to 80° with a step of 0.02°. XRD analysis gave Size and degree of crystalline of the particles [7]. Its structural characterizations were studied with the nano plant leaves powder.

7. Field Emission Scanning electron microscope (FESEM) and energy-dispersive x-ray Spectroscopy (EDAX):-

7.1 Sample preparation:-

Primary fixation of roots, blubs, stems and leaves was done by each parts immersing in 4% glutaraldehyde and in 0.2 M phosphate buffer (pH 7.2) at room temperature. After that samples were rinsed 4 times for 15 –20 min with buffer without aldehyde fixatives. Then, all samples were dehydrated with ethanol series. Samples were mounted, and gold coating was done by IB2 ion coater machine for FESEM investigations. Internal roots stem and leaf structures were examined by FESEM photographs [8]. FESEM model Hitachi-SU attached with energy-dispersive x-ray spectroscopy provides supplementary information and is used for Arsenic and other element detections in different plant parts.

Result:

Soil of industrial area was highly polluted and acidic in nature and potassium, nitrogen , sulphur are present in this soil in high amount (Fig : 1).

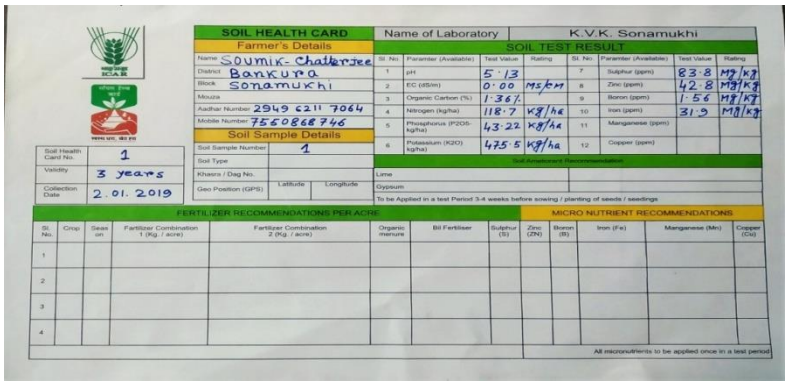
In *Brassica nigra* plant, in control condition all seeds were germinated but rate of germination of seeds gradually decreased with arsenic concentrations. All blubs of *Allium sativum* were germinated in control as well as different concentration of arsenic condition (Fig:2,3). Chromosomal abnormality gradually increased with the increasing arsenic concentrations (Fig:4).

Some primary and secondary metabolites were found in each Arsenic treated and untreated leaves extract of *Allium sativum, Allium cepa* and *Brassica nigra*. Some primary and secondary metabolites were not found in 50 ppm and 100 ppm arsenic treated leaves extract of *Brassica nigra* .

Various extracts of *Brassica nigra* showed significant antimicrobial activity with *E.coli* pathogens due to the contribution of these phytochemicals. An antimicrobial activity of leaves of *Brassica nigra* was observed by agar well diffusion method by measuring the diameter of zone of inhibition (in mm)[11]. Significant decrease in the zone of inhibition was observed on increasing the concentration of Arsenic treated *Brassica nigra* leaf extracts (fig-5). *E.coli* was found to be highly sensitive to methanol extract followed by equivalent sensitivity by water extract.

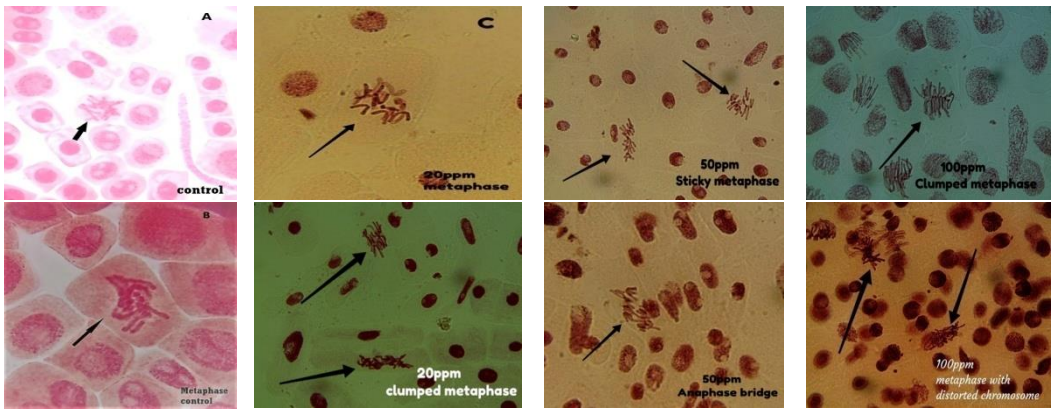
The X-ray diffraction pattern of the leaf powder of *Brassica nigra* plant is shown in Fig.6. Indexing is the process of determining the size and shape of the unit cell given the peak positions in a diffraction pattern. The term gets its name from the assignment of Miller index labels to individual peaks[12]. For most applications, the index labels are less important than are the unit cell length and angle parameters that provide the link between crystal properties and the diffraction pattern.

Structure of stomata and epicutilar wax of *Allium sativum* leaves and as well as *Brassica nigra* gradually changed with the increasing concentrations of Arsenic. The micrographs of stem cross sections of As treated plants *Brassica nigra* were showed clotted depositions along the walls of xylem and phloem vessels compared to control group. The depositions were also seen in roots of As-treated plants *Brassica nigra* but were less intense compared to the stems [14]. The microscopic study of blubs cross section of As treated plant *Allium sativum* showed structural changes of xylem vessels and gradually increased with the increasing As concentration. The surface of root of *Allium sativum* changed gradually with the increasing arsenic concentrations (Fig:7). Accumulation of arsenic was detected only in root system of *Allium sativum* and also arsenic was detected in root, stem , leaf of *Brassica nigra* at different concentrations .

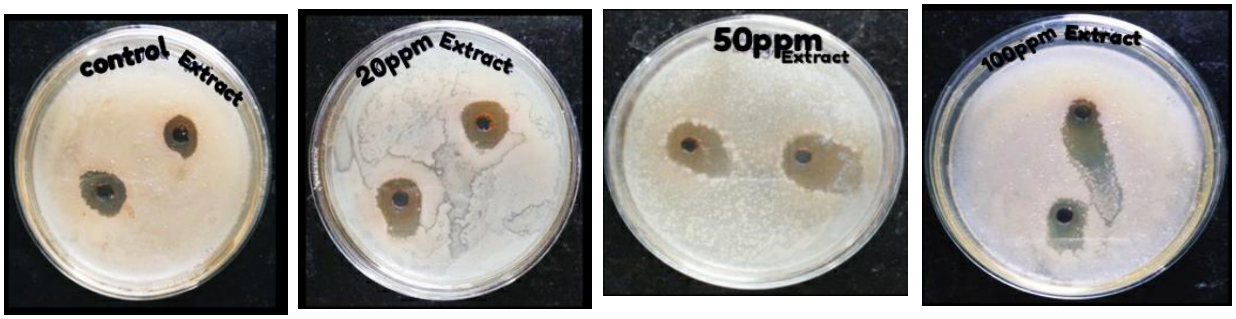


[Fig 1:- soil test]

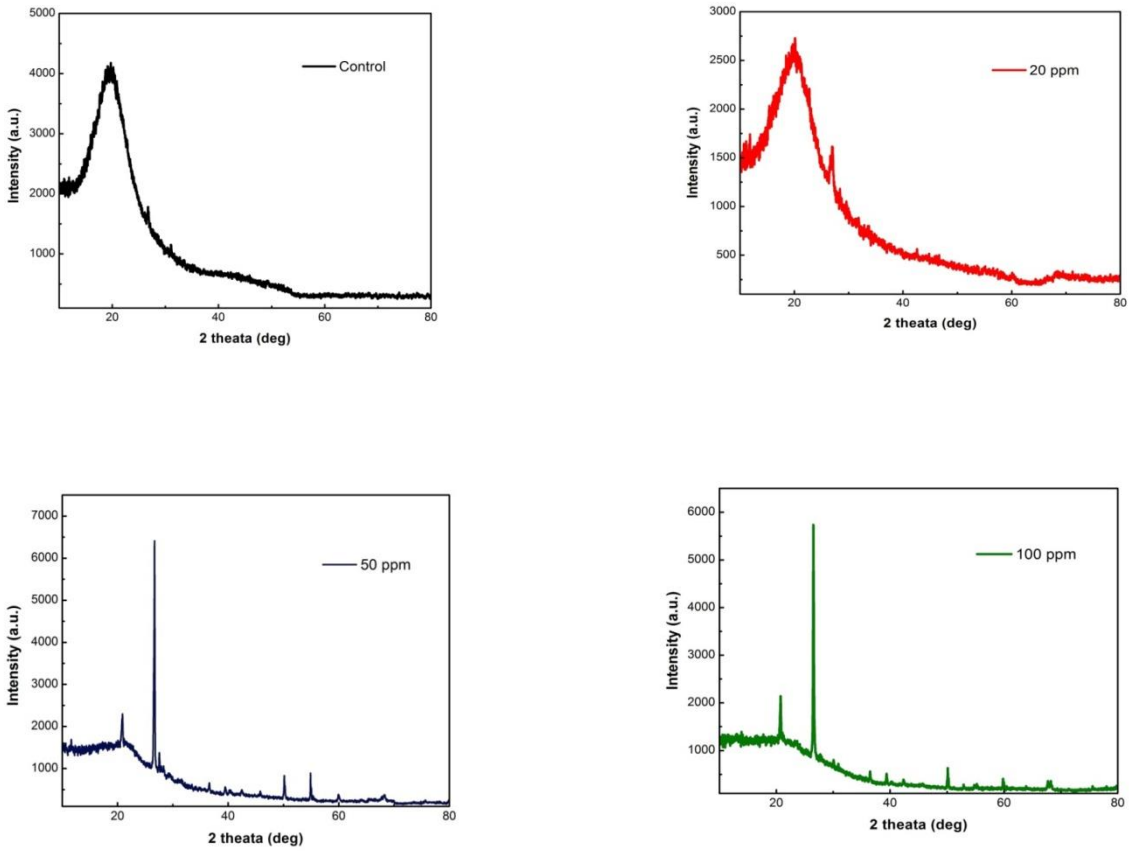
[Fig 2:- Germination pattern of *Brassica nigra*] **[Fig 3:- Germination pattern of *Allium sativum*]**



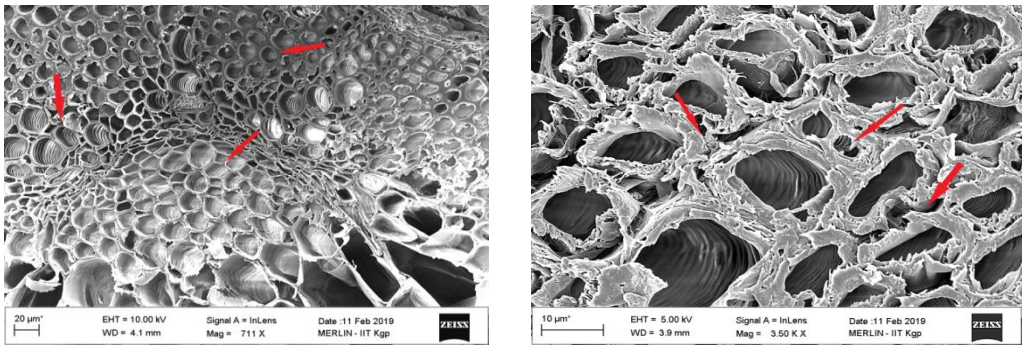
[Fig 4:- Cytotoxicity of different concentration arsenic treated *Allium sativum* root tip]



[Fig-5: Antimicrobial activity test of arsenic treated *Brassica nigra* leaf against *Escherichia coli*]



[Fig-6: X-Ray Diffraction analysis of *Brassica nigra*]



[Fig-7: FESEM microscopy of stem anatomy in control as well as Arsenic treated (20ppm ,50ppm ,100ppm) *Brassica nigra*]

Discussion:

Soil was highly acidic in nature and highly polluted [Fig-1].The germination rate of *Brassica nigra* plant seeds were decreased gradually with the increasing arsenic concentrations. In control condition all seeds (40) were germinated but in 100ppm arsenic condition only 17 seeds were germinated [Fig-2]. Arsenic inhibited the germination rate of *Brassica nigra* seeds but all blubs of *Allium sativum* and *Allium cepa* were germinated in control as well as in presence of arsenic. Arsenic not inhibited the blubs germination of *Allium cepa* and *Allium sativum* [Fig-3].The growth of *Allium sativum* gradually decreased with the increasing arsenic concentrations. In control condition, *Allium sativum* height was 24cm ,and in 20ppm ,50ppm and 100ppm condition height were 22cm ,18cm and 14cm respectively because arsenic inhibited the growth of plant [15]. In *Brassica nigra* plant growth, height of plant in control , 20ppm , 50ppm and 100ppm condition were 20.5cm,19 cm,17 cm,15.4 cm respectively. The number of root and root length of *Allium cepa* and *Allium sativum* gradually decreased with the increasing Arsenic concentrations. In 100ppm arsenic concentration root length was totally decreased in both the plants. In *Brassica nigra* number of lateral roots were gradually decreased and roots length was totally inhibited in 100ppm concentration of arsenic .

To study the effect of genetic damage in the meristematic cells of *Allium cepa ,Allium sativum* roots were analyzed to record the mitotic index, incidence of mitotic anomalies. Germinated roots, exposed to control condition did not show significant mitotic inhibition. The higher concentrations of 20, 50, 100 ppm of arsenic treatment reduced the mitotic activity of roots of *Allium cepa ,Allium sativum* and *Brassica nigra*. Chromosomal aberrations were induced at all the tested concentrations. The most frequent aberration was bridges and sticky chromosomes. Chromosome with disturbed spindles and fragments were also present in appreciable amounts. In *Allium cepa , Allium sativum* and *Brassica nigra* chromosome aberrations were occurred with cetain growth restrictions. Sticky chromosome represent poisoned chromosome with sticky surface and probably lead to cell death. Sticky chromosome at metaphase and anaphase stage were abundant in the Allium indicating its toxicity (Fig: 4, 5). Genotoxicological effect was developed in *Allium sativum* and *Brassica nigra*. In the present investigation a significant increase of the frequency of abnormal cells with chromosomal aberration was found in *Allium cepa , Allium sativum* and *Brassica nigra* root meristematic cells in presence of arsenic .

In our present study of *Brassica nigra* , the phytochemical investigation on the aqueous extract of *Brassica nigra* leaves; which indicates the presence of rich amount of secondary metabolites such as alkaloids, flavonoids, glycosides, cardiac glycosides tannin, phenolic compounds, saponins, terpenoids and steroids. Secondary metabolites especially alkaloids, flavonoids, saponins, and tannins are known to have curative activity against several pathogens [8]. The amount of all primary and secondary metabolites were decreased with the increasing arsenic concentrations in tested plants [16]. In 100ppm leaf extract condition flavonoids ,terpenoids and tannin were not found and amino acid ,protein ,carbohydrate were found in very low amounts.

An antimicrobial activity of leaves of *Brassica nigra* was observed by agar well diffusion method and by measuring the diameter of zone of inhibition (in mm). Two concentrations of extracts were taken (200µg) and tested against *Escherichia coli*. Significant increase in the zone of inhibition was observed on increasing the concentration of extracts. *E.coli* was found to be highly sensitive to methanol extract followed by equivalent sensitivity by water extract of the plant. Water extract showed second highest inhibition, methanol extract was found to be more potent antibacterial agent against *E.coli* followed by ethanolic extract. Among the tested strain, methanol extract of *Brassica nigra* showed high degree of inhibition.The observations suggested that certain bioactive compounds are responsible for the antimicrobial activity. The effectiveness is not due to one of its constituents, but may be the combined action of many constituents namely alkaloids, tannins, flavonoids, steroids and quinines [18]. Our preliminary studies confirmed that above all phytochemicals present in the methanolic extract of *Brassica nigra* . Antimicrobial activity is gradually decreased against bacteria with the increasing concentration of arsenic treated leaf extract.

In XRD-Analysis degree of crystalline is perhaps the most common quantitative application of XRD. When the amorphous phase is present or suspected, XRD can be used to characterize the material and determine the ratio of crystalline to amorphous material in the sample [19]. Crystalinity was absence in all leaf powder of *Brassica nigra* (control ,20ppm, 50ppm, 100ppm) and it was amorphous in structure. After treating with arsenic at a certain limit same signal was received but in 50ppm and 100ppm arsenic treated plant leaf powder there might be some formation of conjugated structure or some crystalline compounds, for this reason very sharp peak was generated in 50ppm and 100ppm arsenic treated plant leaf powder.

In FESEM study leaves of *Allium sativum* were not strongly affected by the treatment with Arsenic at different concentrations but the epicutilar wax on the epidermal cell of *Allium sativum* leaves were gradually decreased with the increasing arsenic concentrations and thickness was also increasing. Internal structure of garlic bulbs under FESEM showed that xylem lumen were gradually decreased with the increasing arsenic concentrations. The external structure of roots were more or less similar after treating with arsenic but in *Brassica nigra* stomata were abnormal in shaped in 50ppm and 100ppm arsenic treated leaves. The internal structure of stem were changed with the increasing arsenic concentration in *Brassica nigra*, xylem lumen were gradually increasing with the increasing arsenic concentrations and phloem walls were disrupted or thickness were increased [20]. *Brassica nigra* stem sections were showed very thick phloem wall in 50ppm and 100ppm arsenic treatment. The vascular bundle of stems were gradually disrupted with the increasing arsenic concentration in *Brassica nigra*. The internal structure of roots of *Brassica nigra* plant showed different ultra structure with the increasing arsenic concentrations (50ppm and 100ppm). Plant root section showed thick phloem and disrupted tissue and big xylem vessels (Fig: 6).

Arsenic was found in roots internal portion of *Allium sativum* but atomic % of other compounds like C and N, O, S ,P, K ,Ca , Mg, Na significant changes were occured. Atomic percentage of Arsenic in control ,20ppm , 50ppm ,100ppm arsenic treated plant were 0.00%, 0.05% , 0.16% , 0.04% respectively which clearly revealed that *Allium sativum* uptake arsenic up to root but not transported to the blub and leaf portion.

Arsenic was found in leaves internal portions because arsenic uptake to this portion of *Brassica nigra* but atomic % of other compounds like C and N, O, S ,P ,k changes occurs. Atomic % of in control ,20ppm , 50ppm ,100ppm arsenic treated plant were 0.00% ,0.61% , 0.61% , 0.54% respectively which confirms arsenic transport up to the leaf of *Brassica nigra* plant .

Conclusion :

Arsenic is known for its toxic effects on plants, animals, chromosomes, genes etc. It adversely affects the growth and yields of the plants. Many industries release heavy metals which contaminate the soil and causing the serious health problems of humans and other animals and also pollutes the environments due to their persistence and bio-accumulative nature. In this study it was observed that arsenic affects on *Allium sativum*, *Allium cepa* and *Brassica nigra* growth and chromosome structures. Arsenic affects on primary and secondary metabolites. In this study, accumulation of arsenic was detected only in root system of *Allium sativum* and also detected in root , stem , leaf of *Brassica nigra* at low to high concentrations.

Acknowledgement:

The Principal Investigator is thankful to Institution (Ramananda college, Bishnupur, Bankura) for funding of this project.

Reference:

[1] Chaudhary, U.K., Biswas, B.K., Roy Choudhury, T., *et al*., (2000). "Ground water Arsenic contamination in Bangladesh and West Bengal, India", Environmental Health Perspective, 108,388-397.

[2] Chadha D.K. and Sinha Roy S.P., (1999). "High Incidence of Arsenic in Groundwater in West Bengal",CGWB, Ministry of Water Resources, Faridabad, India, July 1999 Report.13(9):175-183.

[3] Heikens, A., (2006). Arsenic Contamination of Irrigation Water, Soil and Crops in Bangladesh: Risk Implications for Sustainable Agriculture and Food Safety in Asia. Food and Agricultural Organization of the United Nations, Regional Office for Asia and the Pacific (Book publication).

[4] Marimuthu KM, Subramaniam MK (1960). A haematoxylin squash method for the root tips of *Dolichos lablab* L. Curr Sci 29:482 –493.

[5] Abedin, M. J., Meharg, A. A., (2002a). Relative toxicity of arsenite and arsenate on germination and early seedling growth of rice (Oryza sativa L.). Plant and Soil. 243:57-66.

[6] Marin, A. R., Masscheleyn, P. H., Patrick, W. H. Jr., (1992). The influence of chemical form and concentration of arsenic on rice growth and tissue arsenic concentration. Plant and Soil. 139: 175–183.

[7] Carbonell-Barrachina, A. A., Burlo-Carbonell, F., Mataix-Beneyto, J., (1995). Arsenic uptake, distribution and accumulation in tomato plants: effect of arsenic on plant growth and yield. J. plant Nutri. 18: 1237-1250.

[8] Abedin, M. J., Cottep-Howells, J., Meharg, A. A., (2002b). Arsenic uptake and accumulation in rice (*Oryza sativa* L.) irrigated with contaminated water. Plant and Soil. 240: 311-319.

[9] Jahan, I., Hoque, S., Ullah, S. M., Kibria, M. G., (2003). Effects of arsenic on some growth parameters of rice plant. Dhaka Univ. J. Biol. Sci. 12: 71- 77.

[10] Kang, L. J., Li, X. D., Liu, J. H., Zhang, X. Y., (1996). The effect of arsenic on the growth of rice and residues in a loam paddy soil. J. Jilin Agric. Univ. 18: 58-61.

[11] Rahman, M. A., Rahman, M. M., Miah, M. A. M., Khaled, H. M., (2004). Influence of soil arsenic concentrations in rice (*Oryza sativa* L.). J. Sub-trop. Agric. Res. Dev. 2: 24-31.

[12] Cox, M. S., Bell, P. F., Kovar, J. L., (1996). Different tolerance of canola to arsenic when grown hydroponically or in soil. J. Plant Nutri. 19: 1599-1610.

[13] Baker, S., Barrentine, W. L., Bowmaan, D. H., Haawthorne, W. L., Pettiet, J. V., (1976). Crop response and arsenic uptake following soil incorporation of MSMA. Weed Sci. 24: 322-326.

[14] M. Azizur Rahman, H. Hasegawa, M. Mahfuzur Rahman,M. Nazrul Islam, and M. A. Majid Miah, A. Tasmin, (2007). Effect of arsenic on photosynthesis, growth and yield of five widely cultivated rice (*Oryza sativa* L.) varieties. 6(3):99-108.

[15] Akinci,I.F. and Akinci, S.,(2010). Effect of chromium toxicity on germination and early seedling growth in melon (*Cucumis melo* L.). Afr. J.Biotech., 9(29): 4589-4594.

[16] Cary, E.E.,Allaway W.H. and Olson O.E.(1997). Control of Cr concentration in food plants, Absorption and translocation of Cr by plants. J.Agric.Food Chem. 25(2):300-304.

[17] Chandran S., Niranjana V. and Joseph Benny (2012). Accumulation of heavy metals in waste water irrigated crops in Mudurai India. J.Environ. Res Develop. 6(3): 432-438.

[18] Chopra,A.K., Pathak,C and Prasad G. (2009). Scenario of heavy metal contamination in agricultural soil and its management. J. Appl.& Nat.Sci.,1(1):99-108.

[19] Ditika Kopliku and Anila Mesi (2013). Assessment of cytotoxic and genotoxic potency of Cr(VI)Doped river water of Nen-Shkodra Lowland, Albania, on *Allium cepa* L. J.of Enviromental Research and Development.7 (4): 119-123.

Paper Published from this Project:

1. **“Phytoremediation Technology : A review” (International Journal of Scientific Research and Reviews).**

2. **Toxic effect of Arsenic trioxide (As_2O_3) on genotoxicity and Cytotoxicity by use of *Allium Cepa* L. (2020). Journal of Advanced Scientific Research. 11(3), July 2020-Herbal Drugs: Traditional, Recent and future aspects.**

3. **Phytoremediation of Arsenic in Industrial Area by three different Plants *Allium sativum*, *Allium Cepa*, *Brassica nigra*: Accepted for publication in book series Environmental Challenges and Solution. (Springer Nature)**

26/12/2020

Signature of Principal

(Dr.Swapna Ghorai)

Principal
Ramananda College,
Bishnupur, Bankura

RAMANANDA COLLEGE ESTD.-1945 (BANKURA) BISHNUPUR

S. Chatterjee

Signature of Principal Investigator

(Dr.Sabyasachi Chatterjee)

RAMANANDA COLLEGE

BISHNUPUR * BANKURA

Pin – 722122, West Bengal

UGC Recognized & State Government Aided Constituent College

Under Bankura University

(Accredited by NAAC at 'B' Level)

Tel - (03244)252059

Tele Fax – (03244) 254427

e-mail–principal@ramanandacollege.org

Website-www.ramanandacollege.org

Ref. No. 539 / B / 2019 **Date- 08-04-2019**

To
Dr. Nilanjana Chatterjee
Assistant Professor of Zoology
Department of Zoology
Ramananda College
Bishnupur, Bankura

Sub : Approval of financial assistance to the Principal Investigators of Minor Research Project (College) on "Histological study of the annual reproductive cyclic of an Indian mino carp Labeo bata (Ham-Buchner, 1822) collected from the local water bodies of Bishnupur SUB-Division".

Madam,

The Research Committee in its meeting held on 25-03-2019 in the presence of honourable members of the Governing Body has approved your proposal of Minor Research Project (involving students) and has also approved an allocation of Rs. 10,000 (Rupees ten thousand) as the 1st installment of the proposed sanction [total sanction Rs. 15,000 (Rupees fifteen thousand)]. The rest of the financial grant will be disbursed after six months on submission of a brief progress report of the project.

Thanking you

Yours faithfully,

8/4/19

(Dr. Swapna Ghorai)
Principal
Ramananda College
Bishnupur, Bankura

Principal
Ramananda College,
Bishnupur, Bankura

TOPIC: TOPIC: Histological study of the annual reproductive cycle of an Indian minor carp *Labeo bata* (Ham-Buchner 1822) collected from the local waterbodies of Bishnupur subdivision

NAME OF THE SUPERVISOR: **Dr. Nilanjana Chatterjee**

NAMES OF THE ASSOCIATED STUDENTS: 1. **Bony Chettry**

2. **Ayesha Khatun**

Period of work: 10 Months (Work Completed)

WORK DONE

Histometric, histochemical and histological studies of the ovary and testes of a carp, *Labeo bata* collected from the local water bodies of Bishnupur demonstrate the annual events of its ovarian and testicular function respectively. The month wise studies reveal that oogonial proliferation and recruitment of primary oocytes occur during resting (November-December) and preparatory phase (January-February), while the testicular scenario reveals the fresh appearance of primary spermatocytes along the border lines. Ovarian and testicular growth are found to be in concert with the enhancement of temperature and photoperiod from the month of March when oocytes are characterised with the inclusion of yolk vesicles and yolk granules while the testicular secondary spermatocytes are found to increase in number and decrease in size. These oocytes are transformed to yolky mature follicles during maturation phase (April to May) while the spermatocytes further reduce in cytoplasmic content and come to lie closer to the follicular lumen forming the cohorts of spermatozoa. On the contrary the maximum oocyte diameter is attained by the mature oocytes during spawning phase (June to August) after germinal vesicle breakdown. The spermatozoa undergoes spermiogenesis forming the swift sperm with prominent long tail. Ovary undergoes regression with

decline of water temperature during September-October. Hypertrophid granulosa cells take active part in resorption of yolky oocytes. The new oogonia appear only after complete resorption of yolky oocytes. Our study reveals environmental factors such as photo-thermal conditions are the major regulator of the gonadal function in *L. bata*.

RESEARCH ACHIEVEMENTS:

Bony Chettry Presented a paper (Poster) in the International Seminar held at SKBU, Purulia, West Bengal, India.

His paper has been appreciated by experts all over the world.

Sd/ Dr. Nilanjana Chatterjee
Department of Zoology
Ramananda college
Bishnupur, Bankura

PROJECT EXPENDITURE SUMMARY

S.No	Purpose	Expense(in Rs)
1.	Specimen Cost	1200.00 /- (10 months)
2.	Travel cost (for Specimen Collection)	1000.00 /- (10 months)
3.	Travel cost (for Laboratory Visit, BU)	1500.00 /- (250 X 6)
4.	SEM, USIC Charges	300/-
5.	Equipments & Chemicals	(2905 + 960+2178)/-=6043/-
6.	Heating device (Induction)	1639/-
7.	Stationaries	510/-
8.	SKBU, International Seminar, presented by Bony Chettry (Registration fee)	1200/-
9.	Food and Travelling	800/-
Total		14,992/- (Fourteen thousand nine hundred and ninety two only)

Sd/ Dr. Nilanjana Chatterjee
Department of Zoology
Ramananda college
Bishnupur, Bankura

26/12/2020
Principal
Ramananda College,
Bishnupur, Bankura

RAMANANDA COLLEGE
ESTD.-1945
(BANKURA)
BISHNUPUR

Annexure –VI

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

~~Annual~~/Final Report of the work done on the Minor Research Project. (Report to be submitted within 6 weeks after completion of each year)

1. Project report No. 1st /2nd /3rd/Final: **Final Report**
2. UGC Reference No. **F. PSW-045/15-16 (ERO) ID No. WB1-066** dated 25th January, 2017, Kolkata.
3. Period of report: **from 25-01-2017 to 22-03-2019.**
4. Title of research project '**Development of Nickel Based Nano-Catalyst for Hydrogenation and Desulfurization of Organic Compounds**'.
5. (a) Name of the Principal Investigator: **Dr. AJAY KUMAR MANNA**

   (b) Deptt. CHEMISTRY.

   (c) ~~University~~/College where work has progressed: RAMANANDA COLLEGE, BISHNUPUR, BANKURA, West Bengal.
6. Effective date of starting of the project: 25/01/2017.
7. Grant approved and expenditure incurred during the period of the report:

   a. Total amount approved Rs. 4,00,000.00 [Rupees Four lakh only]

   b. Total expenditure Rs. 3,60,549.00 [Rupees Three lakh sixty thousand five hundred forty nine only.]
8. Report of the work done: **Report enclosed**.

   i. Brief objective of the project: **Report enclosed.**

   ii. Work done so far and results achieved and publications, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication: **Two oral presentations and one paper will be communicated shortly.**

   iii. Has the progress been according to original plan of work and towards achieving the objective? if not, state reasons: **Yes ,The progress of the project work is according to the original plane**.

   iv. Please indicate the difficulties, if any, experienced in implementing the project: **No such, the main objective of the project has been achieved successfully**.

   v. If project has not been completed, please indicate the approximate time by which it is likely to be completed. A summary of the work done for the period (Annual basis) may please be sent to the Commission on a separate sheet. **Completed (Final Report)**

vi. If the project has been completed, please enclose a summary of the findings of the study. One bound copy of the final report of work done may also be sent to University Grants Commission:

Status of the project: completed
Two copies of the final report of the work done have been enclosed.

vii. Any other information which would help in evaluation of work done on the project. At the completion of the project, the first report should indicate the output, such as (a) Manpower trained (b) Ph. D. awarded (c) Publication of results (d) Other impact, if any:

Two oral presentations were done and one paper will be communicated shortly.

Ajay Kumar Manna.

SIGNATURE OF THE PRINCIPAL INVESTIGATOR

PRINCIPAL INVESTIGATOR
UGC-MINOR RESEARCH PROJECT
RAMANANDA COLLEGE, BISHNUPUR
BANKURA(WB), 722122, INDIA

~~SIGNATURE OF THE CO-INVESTIGATOR~~

~~REGISTRAR~~/PRINCIPAL

(Seal)

Principal
Ramananda College
Bishnupur, Bankura

BISHNUPUR ★ RAMANANDA COLLEGE ★ ESTD. - 1945 (BANKURA)

RAMANANDA COLLEGE
BISHNUPUR * BANKURA
Pin – 722122, West Bengal
UGC Recognized & State Government Aided Constituent College
Under Bankura University
(Accredited by NAAC at 'B' Level)

Tel - (03244)252059
Tele Fax – (03244) 254427
e-mail–principal@ramanandacollege.org
Website-www.ramanandacollege.org

Ref. No. 538 / B / 2019

Date- 08-04-2019

To
Prof. Anjan Kumar Bandyapadhyay
Associate Professor of Bengali
Department of Bengali
Ramananda College
Bishnupur, Bankura
&
Dr. Narendra Ranjan Malas
Associate Professor of English
Department of English
Ramananda College
Bishnupur, Bankura

Sub : Approval of financial assistance to the Principapl Investigators of Minor Research Project (College) on "Local/Regional Dialects and Endangered languages in Bishnupur Sub-Division : A field Survey".

Sir,

The Research Committee in its meeting held on 25-03-2019 in the presence of honourable members of the Governing Body has approved your proposal of Minor Research Project (involving students) and has also approved an allocation of Rs. 7,000 (Rupees seven thousand) as the 1st installment of the proposed sanction [total sanction Rs. 10,000 (Rupees ten thousand)]. The rest of the financial grant will be disbursed after six months on submission of a brief progress report of the project.

Thanking you

RAMANANDA COLLEGE ESTD -1945 (BANKURA) BISHNUPUR

Yours faithfully,

8/4/2019
(Dr. Swapna Ghorai)
Principal
Ramananda College
Bishnupur, Bankura

Principal
Ramananda College,
Bishnupur, Bankura