# Final Completion Report for R&D Projects [Year 2011-15]*

## IIT GUWAHATI

## Section-A: Project Details

**A1. Project Title: Molecular and Physico-chemical characterization of selected ginger species from North Eastern Region.**

**A2. DBT Sanction Order No. & Date: BT/33/NE/TBP/2010 dt 25/3/2011**

**A3. Name of Principal Investigator: Dr. Latha Rangan**
**Name of Co-PI/Co-Investigator: N.A.**

**A4. Institute: Indian Institute of Technology Guwahati Assam**

**A5. Address with Contact Nos. (Landline & Mobile) & Email:**
Department of Biotechnology,
Indian Institute of Technology Guwahati, Assam -781 039
Ph. 0361-2582214, 09435016913.
lrangan@iitg.ernet.in and latha_rangan@yahoo.com

**A6. Total Cost: 1310000.00 Lakh (2011-2012) + 3,45,000.00 Lakh (2012-2013) +4,88,000.00 (2014-15) = Rs 21,43,000.00**

**A7. Duration: 3 Years**

**A8. Approved Objectives of the Project:**

- Cytological Analysis
- Molecular Analysis- ISSR

**A9. Specific Recommendations made by the Task Force (if any): N.A.**

**MSSRF**

**Section-A: Project Details**

**A1. Project Title: Molecular and Physico-chemical characterization of selected ginger species from North Eastern Region.**

**A2. DBT Sanction Order No. & Date: BT/33/NE/TBP/2010 dt 25/3/2011**

**A3. Name of Principal Investigator: Dr. Ajay Parida**
**Name of Co-PI/Co-Investigator: N.A.**

**A4. Institute: Indian Institute of Technology Guwahati Assam**

**A5. Address with Contact Nos. (Landline & Mobile) & Email:**
MS Swaminathan Research Foundation,
Taramani Institutional Area
3rd Cross Street, Chennai -600113
Ph. 044 22541229/22541698.
ajay@mssrf.res.in/ executive director@mssrf.res.in

**A6. Total Cost:**

**A7. Duration: 3 Years**

**A8. Approved Objectives of the Project:**

- Molecular Analysis -AFLP

**A9. Specific Recommendations made by the Task Force (if any): N.A.**

**Tezpur University**

**Section-A: Project Details**

**A1. Project Title: Molecular and Physico-chemical characterization of selected gingerspecies from North Eastern Region**

**A2. DBT Sanction Order No. & Date: BT/33/NE/TBP/2010 - 25/3/2011**

**A3. Name of Principal Investigator:** Dr. Sudip Mitra
**Name of Co-PI/Co-Investigator:** N.A.

**A4. Institute: Tezpur University (**shifted from Jawaharlal Nehru University, New Delhi)

**A5. Address with Contact Nos. (Landline & Mobile) & Email:** Department of Environmental Science, Tezpur University, Nappam, Tezpur, Assam 784028.
Ph. 0361-275613, Mobile: 8486066392, Email: sudipmitra@yahoo.com

**A6. Total Cost: 14.7 Lakh** (actual released amount Rs 10.27 lakh)

**A7. Duration: 3 Years**

**A8. Approved Objectives of the Project:**

- To study the impact of various soil types on the biochemical compositions of selected ginger species
- To study the impact of soil quality on the elemental uptake by crops.

**A9. Specific Recommendations made by the Task Force (if any):** N.A.

## Section-B: Scientific and Technical Progress

### B1. Progress made against the Approved Objectives, Targets & Timelines during the Reporting Period

| Period of study | Achieved targets |
|---|---|
| April-Sep 2011 | We Procured equipment and chemicals, recruitment of the Project staff |
| | Collected Plants raised in Pots and in Hydroponics culture |
| | DNA Extraction standardization |
| | We visited the sites and collected cultivars of ginger and soils from north eastern part of India and the cultivation is in progress for getting the first generation yield. |
| October 2011- March 2012 | Time of standardization for collection of roots tips harvest genera wise and Protocol standardization for ploidy determination |
| | Quality and Quantity check of extracted DNA, Primer selection and optimization |
| | We started extracting the biochemical content of the crop by extracting out its volatile oil and oleoresin extract as the crop has major constitution of volatile and oleoresin matter. |
| | Extraction was started by the method of hydrodistillation using Clevenger apparatus to get the volatile oil followed by soxhelation of the exhausted mass to get the oleoresin matter using different solvents. |
| | volatile oil which will be carried for further analysis using GCMS and IR characterization studies. |
| April – Sep 2012 | Chromosome count determination and validation with Flow Cytometry analysis for *Hedychium*, Oil extraction has been continued, carried out soil analysis for various elements |
| Oct 2012- March 2013 | Chromosome count determination and validation with Flow Cytometry analysis *and* Genetic diversity and gene diversity studies in *Kaempferia,* HPTLC investigations of ginger extract. Plants are being managed in natural conditions in the university garden. |
| April – March 2014 | Chromosome count determination and validation with Flow Cytometry analysis and Genetic diversity and gene diversity studies in Zingiber |
| April 2014- March 15 | Chromosome count determination and validation with Flow Cytometry analysis for Curcuma *and* Genetic diversity and gene diversity studies in Curcuma. Presence of Shogaol was confirmed in the Moran ginger oil as extracted by three different solvents viz. water, acetone and methanol. HPTLC analysis was carried out over a long period of time to confirm this. |
| April 15– Nov 2015 | Chromosome count determination and validation with Flow Cytometry analysis for *Alpineae and* Genetic diversity and gene diversity studies in Alpinia. Anti-microbial efficiency of a selected spp of Ginger (Moran) was tested against various diseases causing bactaria.<br><br>Consolidation of Report |

**B2. Summary and Conclusions of the progress made so far** (min 100 words, max 200 words)

In this project cytology, molecular markers and physico-chemical analysis assessment of Zingiberaceae) has been carried out so far. Potential importance of Zingiberaceae can be estimated on the basis of extensive knowledge of genetic makeup of polyploids caused primarily due to hybridisation and genome duplication. Flow cytometry with propidium iodide (PI) as the DNA stain, was used to estimate the nuclear DNA content (2C) of 24 species of the Zingiberaceae occurring in northeast (NE) India. Lowest nuclear DNA content was found in Curcuma leucorrhiza (1.681±0.006 pg), and the highest value was observed for Kaempferia galanga (7.966±0.020 pg), whereas the fold variation was 4.74 fold among the 24 species studied. Nuclear DNA content for 7 species of Zingiberaceae has been reported for the first time. In addition, chromosome numbers for 9 species of Zingiberaceae was determined and five different chromosome counts (2n=21, 34, 42, 55, 63) were observed. The correlation of nuclear DNA content and chromosome number of the studied Zingiberaceae species revealed emergence of the evolutionary younger taxa. The study provided an insight into the phylogenetic relationship between cultivated and wild relatives of Zingibereceae. ISSR markers are more discriminating than AFLP to evaluate the genetic diversity/relationship among family from the rich flora of NE India. For physico-chemical analysis, plant and soils were collected from various sampling sites (Fig. 1) and later were analysed for various elements. Ginger oils were extracted from one species i.e. Moran. Oleoresin was obtained. HPTLC analysis of the ginger extract were carried out and presence of 6-shogaol was confirmed. The ginger oil or extracts showed potential for anti-microbial activities. Methanol extracted ginger oil showed maximum efficiency for antimicrobial activities followed by acetone and water extracted ginger extracts. Heavy metals were found to be below detectable limit in the soils where from these gingers were sampled. Exploration and evaluation of diversity would be of great significance for *in situ* conservation of important species of the tribe: Hedychiae especially for their scientific and commercial programmes. Furthermore, the scientific data presented inform of cytology and genome size indicates strong phylogenetic evaluation of the tribe Hedychiae.

# IIT Guwahati---NE

This project is an attempt to collect, maintain and characterize members of Zingiberaceae (*Alpinia*, *Curcuma*, *Hedychium* and *Kaempfeia and Zingiber*) found wildly in the Northeast part of India so as to open a door for further studies of cytological, molecular and physico-chemical analysis of the family Zingiberaceae.

***1. Collection and Field Study***

Collection and identification of plants is an ongoing process of this programme. Plants belonging to Tribe Hedychiae were collected from their natural habitats across NE India and maintained in the Departmental Garden, Gauhati University (Table1). The collections were made during the flowering season (April-August) when it was appropriate to tag them.

***2. Cytological Analysis***

Number of species that were studied for ploidy level determination was 27 of which chromosome count has been determined for 26 species. For investigating the chromosome number of different species, the collection time of root tips was first optimized which was found to vary between 07.00-11.30 am in the morning. The slides revealed well-spread metaphases under low power (10X) and high power (40X) magnifications in compound light microscope. Some cells were also found to be

in late prophase and anaphase stages. The chromosome number of C. amada (2n=42), C. caesia (2n = 21), C. zanthorrhiza (2n = 63), K. angustifolia (2n=22), K. elegans (2n=22), K. galanga (2n=55), H. chrysoleucum, H. gardnerianum and H. coronarium (2n=34) were documented.

## IIT Guwahati---NE and MSSRF

***3. Molecular Analysis -*** *Determination of nuclear DNA content (2C value)*

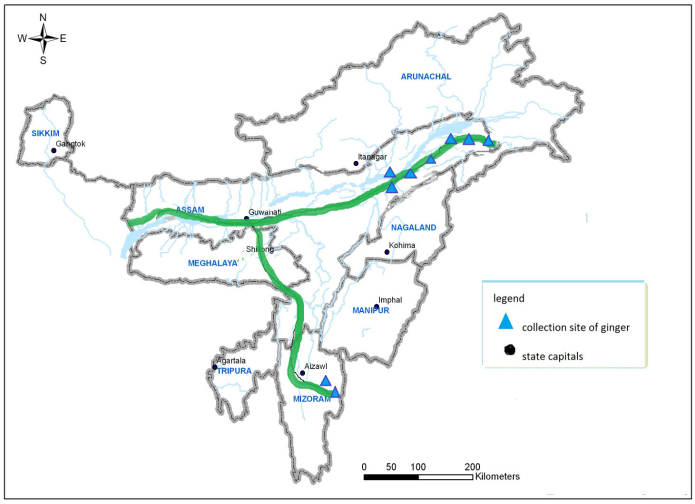
Young leaves were selected as the material for flow cytometric estimation of nuclear DNA content (2C) in absolute units for 24 Zingiberaceae species occurring in NE India. To minimise errors, nuclear DNA content (2C) was estimated against four standards. Clearly defined histograms were obtained with CV of <5% against four standard used in current study (Fig. 2). The nuclear DNA content (2C) of C. angustifolia was found to be 2.49±0.09 pg with O. sativa, 2.48±0.04 pg with S. lycopersicum, 2.36±0.07 pg with Z. mays and 2.45±0.03 pg with P. sativum respectively. Similarly the nuclear DNA content (2C) of H. ellipticum was found to vary from 3.46±0.05 pg (using S. lycopersicum as standard) to 3.83±0.05 pg (using P. sativum as standard). Nuclear DNA content (2C) of G. bulbifera was found in the range of 2.42±0.02 pg (using S. lycopersicum as standard) to 2.59±0.05 pg (using Z. mays as standard). The nuclear DNA content (2C) of B. longifera was found to be 9.29±0.04 pg (O. sativa), 8.93±0.03 pg (S. lycopersicum), 9.02±0.05 pg (Z. mays) and 7.96±0.03 pg (P. sativum).

The nuclear DNA content (2C) varied among different standards. So it was necessary to execute a statistical regression analysis to find the nuclear DNA content of each of the Zingiberaceae species studied. A straight-line relationship was observed between the nuclear DNA amounts (2C) of the four standards and ratio of the MFI of Zingiberaceae plants to standards (p1/p2). The coefficient of determination (r2) was 1.000 . For the genus Curcuma, the range of nuclear DNA content (2C) was found to be 1.680 pg (C. leucorrhiza) -2.890 pg (C. aromatica), with 1.720 fold variation. For Hedychium, the range of nuclear DNA content (2C) was found to be 1.967 pg (H. coronarium) - 4.300 pg (H. gardnerianum) with 2.186 fold variation. For the genus Kaempferia, the range of nuclear DNA content (2C) was found to be 3.489 pg (K. elegans) - 7.966 pg (K. galanga) with 2.280 fold variation. Taking into consideration 24 Zingiberaceae species, the variation was found to be 4.740 fold.

## J.N.U., New Delhi (later transferred to Tezpur University, Assam)

We collected the cultivars of the crop (Ginger in this case) and soil from various parts of North Eastern. One of the species of the crop was selected as first sample from North east and started for analysis. We started extracting the biochemical content of the crop by extracting out its volatile oil and oleoresin extract as the crop has major constitution of volatile and oleoresin matter. Extraction was started by the method of hydro-distillation using clevenger apparatus to get the volatile oil followed by soxhelation of the exhausted mass obtained from clevenger apparatus to get the oleoresin matter using different organic solvents. We have collected around 5-7ml of volatile oils which were further used to carry out further analysis using HPTLC, GCMS and IR characterization studies. Oil extract collected through three different solvents as mentioned above were tested for their anti-microbial activities. Heavy metals content in the soils were also analyzed to explore if there is any chance of contamination in the ginger samples/oils due to these metals.

**Fig.1**: Sites of ginger collection in the North Eastern region of India for the physico-chemical study.




## B3. Details of New Leads Obtained, if any:

**1.** Chromosome number of some species of *Kaempferia* and *Hedychium* is a new count. The ploidy determination has been done for the first time for many species and does not show any polyploidy.

2. Genetic diversity analysis using molecular markers is first of its study for the species (Tribe Hedychiae) from NE India. AFLP by means of capillary electrophoresis has been used for the first time and found very efficient.

3. Flow Cytometry estimation of Zingibereceae species has been reported for the first time.

4. The ginger (mainly Moran) under this experiment contains shogaol as one of its major constituents

5. Heavy metals were below detectable limit in the soils where from these gingers were sampled.

6. Ginger oil from Moran spp. extracted through methanol showed maximum efficiency for antimicrobial activities followed by acetone and water.

**B4. Details of Publications & Patents, if any:**

1. S Basak, AM Ramesh, V Kesari, **S Mitra, A Parida, L Rangan*** (2014) Molecular phylogeny of Hedychium from Northeast India as dissected using PCA analysis and hierarchical clustering. ***Meta Gene*** 2: 459–468.

2. A Das, V Kesari, Ms Vinod, **A Parida, S Mitra**, **L Rangan* (**2013**)**. Comparison of ISSR and AFLP marker analysis and chromosome number assessment as a means to study the genetic structure of the medicinal and scarce wild crop, *Zingiber moran* ecotypes. ***Plant Biosystems*** DOI:10.1080/11263504.2013.795197.

3. A Das[#], V Kesari[#], MS Vinod, **A Parida**, **L Rangan*** (2012). Genetic relationship of *Curcuma* species from North East India using PCR based markers ***Molecular Biotechnology*** 49: 65-76.

## Section-C: Details of Grant Utilization

**Lead Organization- IIT Guwahati**

**C1. Equipment Acquired or Placed Order with Actual Cost: 7,29,906**

**C2. Manpower Staffing and Expenditure Details:**

**Particulars of the Manpower working in the project for the year 2011-12**

| S.No. | Manpower | Educational Qualification | Date of Joining | Monthly Stipend +HRA | Total Amount |
|---|---|---|---|---|---|
| | | | | | |

Interview was conducted to recruit a staff in the project. Staff selected through selection process did not join and hence waiting list was activated. The candidate in the waiting list also did not join the project. Meanwhile the work was carried out by the PhD student working in area of Zingibereceae.

**C3. Details of Recurring Expenditure: Year 2014-2015**
**Recurring (Head-wise)**

| Section | Sanctioned Amount | Received Amount | Total Amount available | Expenditure |
|---|---|---|---|---|
| **Manpower** | **7,20,000.00** | **3,98,000.00** | **2,48,709** | **1,49,291.00** |
| **Consumable** | **5,50,000.00** | **5,50,000.00** | **15** | **5,49,985.00** |
| **Contingency** | **90,000.00** | **89,000.00** | **-10317** | **99,317.00** |
| **Travel** | **3,00,000.00** | **2,56,000.00** | **-6694** | **2,62,694.00** |
| **Overhead** | **1,50,000.00** | **1,50,000.00** | **NIL** | **1,50,000.00** |
| **Total** | **18,10,000.00** | **14,43,000.00** | **2,31,713** | **12,11,287.00** |

**C4. Financial Requirements for the Next Year with Justifications:**

Project has come to a completion and all objectives defined were achieved

**[Signature(s) of the Investigator(s)]**

***FINALCONSOLIDATED STATEMENT OF EXPENDITURE***
***(FOR FINAL SETTLEMENT OF ACCOUNTS)***

**1. Title of the Project** **: Molecular & Physic- chemical characterization of selected ginger species from north eastern region"**

**2. Sanctioned Project Cost** **:Rs.25.10 Lakhs**

**3. Revised cost, if any** **:NIL**

**4. Duration of the project** **:3 years**

**5. Sanction Order No. & Date** **:** BT/33/NE/TBP/2010

**6. Date of commencement of Project** **:11.05.2011**

**7. Extension, if any** **:**

**8. Date of completion of project** **:30.11.2015**

## Details of grant, expenditure and balance

| ITEM | SANCTIONED OUTLAY | RELEASES BY DBT | | | | | | | EXPENDITURE AS PER Statement of expenditure | | | | | | | BALACNE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Financial Year | | | | | | | Financial year | | | | | | TOTAL | |
| | | 1st | 2nd | 3rd | 4th | 5th | 6th | TOTAL | 1st | 2nd | 3rd | 4th | 5th | 5th | | |
| Equipment | 7,00,000 | 7,00,000 | NIL | NIL | NIL | | | 7,00,000 | 7,29,906 | NIL | NIL | -29,906 | NIL | NIL | 7,00,000 | NIL |
| Staff | 7,20,000 | 2,30,000 | NIL | NIL | 1,68,000 | | | 3,98,000 | NIL | NIL | 1,38,047 | 11,244 | NIL | NIL | 1,49,291 | 2,48,709 |
| Consumables | 5,50,000 | 2,00,000 | 2,00,000 | NIL | 1,50,000 | | | 5,50,000 | 2,34,865 | 90,880 | 74,255 | 1,49,985 | NIL | NIL | 5,49,985 | 15 |
| Travel | 3,00,000 | 1,00,000 | 66,000 | NIL | 90,000 | | | 2,56,000 | 65,795 | 5,273 | 84,753 | 78,953 | 27,920 | NIL | 2,62,694 | -6,694 |
| Contingency | 90,000 | 30,000 | 29,000 | NIL | 30,000 | | | 89,000 | 29,569 | 505 | 1,31,102 | -61859 | NIL | NIL | 99,317 | -10,317 |
| Overhead | 1,50,000 | 50,000 | 50,000 | NIL | 50,000 | | | 1,50,000 | 50,000 | 50,000 | NIL | 50,000 | NIL | NIL | 1,50,000 | NIL |
| Total | 25,10,000 | 13,10,000 | 3,45,000 | NIL | 4,88,000 | | | 21,43,000 | 11,10,135 | 1,46,658 | 4,28,157 | 1,98,417 | 27,920 | NIL | 19,11,287 | 2,31,713 |

TOTAL INTEREST EARNED= NIL

**(PROJECT INVETIGATOR)**

## Section-C: Details of Grant Utilization

**Participating Organisation- JNU/Tezpur University**

**C1. Equipment Acquired or Placed Order with Actual Cost: Nil**

**C2. Manpower Staffing and Expenditure Details:**

**Particulars of the Manpower working in the project for the year 2014-15 & 2015-16**

| NAME OF THE PERSON | NAME OF THE POST | DATE OF JOINING | DATE OF LEAVING | TOTAL MONTHLY SALARY | TOTAL SALARY PAID DURING THE FINANCIAL YEAR | TOTAL SALARY PAID DURING PROJECT PERIOD |
|---|---|---|---|---|---|---|
| Ms Pronami Baruah | JRF | 10.11.2014 | 30.04.2015 | 12000.00 | 12000.00 | 68400.00 |
| | | | | | | |

**C3. Details of Recurring Expenditure for 2014-15 and 2015-16:**

## Recurring
## (Head-wise)

Please see below the consolidated expenditure:

***FINALCONSOLIDATED STATEMENT OF EXPENDITURE***
***(FOR FINAL SETTLEMENT OF ACCOUNTS)***

**1. Title of the Project : Molecular and physcico-chemical characterization of selected ginger species from North Eastern region**
**2. Sanctioned Project Cost : 14.7 lakh**

**3. Revised cost, if any : Yes, total released Rs. 10.27 lakh**

**4. Duration of the project : March 2011-Jan 2015**

**5. Sanction Order No. & Date : BT/33/NE/TBP/2010-25/3/2011**

**6. Date of commencement of Project : 23/03/2011**

**7. Extension, if any : YES**

**8. Date of completion of project : 20/01/2015**

**Details of grant, expenditure and balance**

| S. No. | Heads | Sanctioned Cost | Year-wise Releases made | | | | | | Year-wise Expenditure incurred | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1st yr (2011-12) | 2nd yr (2012-13) | 3rd Yr (2013-14) | 4th Yr (2014-15) | 5th yr (2015-16) | Total | 1st yr (2011-12) | 2nd yr (2012-13) | 3rd Yr (2013-14) | 4th Yr (2014-15) | 5th yr (2015-16) | Total | Balance |
| **A. Non-recurring pageno.-** | | | | | | | | | | | | | | | |
| | Equipments | 150000.00 | 150000.00 | 0.0 | 0.00 | **(-150000.00)** 1.5 lakh has been converted in to various recurring heads in this year by DBT. An extra 1.45 lakh was given for manpower only | 0.00 | 0.00 | 0.0 | 0.0 | 0.00 | **(-150000.00)** 1.5 lakh has been converted in to various recurring heads in this year by DBT. An extra 1.45 lakh was given for manpower only | 0.0 | | 0.0 |
| **B. Recurring** | | | | | | | | | | | | | | | |
| 1. | Manpower | | 250000.00 | 124000.00 | | 145000.00 + 31000.00 | | | 124107.00 | 145600.00 | 0.00 | 56400.00 | 12000.00 | | |
| 2. | Consumables | | 50000.00 | 49000.00 | | 15000.0 | | | 49039.00 | 25448.00 | 0.00 | 172216.00 | 0.00 | | |
| 3. | Travel | | 50000.00 | 50000.00 | | 25000.00 | | | 62397.00 | 12341.00 | 0.00 | 0.00 | 0.00 | | |
| 4. | Contingency | | 40000.00 | 19000.00 | | 29000.00 | | | 28653.00 | 9011.00 | 19869.00 | 1184.00 | 0.00 | | |
| 5. | Overhead | | 50000.00 | 50000.00 | | 50000.00 | | | 50000.00 | 50000.00 | 0.00 | 0.00 | 31250.00 | | |
| | **Total** | | **440000.00** | **292000.00** | | **295000.00** | | | **314196.00** | | | | | | |
| | **Grand Total (A+B)** | | **590000.00 (-150000.00)** | **292000.00** | **0.00** | **295000.00** | **0.00** | **1027000.00** | **314196.00** | **242400.00** | **19869.00** | **229800.00** | **43250.00** | **849515.00** | **177485.00** |

**[Signature(s) of the Investigator(s)]**

## Section-C: Details of Grant Utilization

**Participating Organisation- JNU/Tezpur University**

**C1. Equipment Acquired or Placed Order with Actual Cost: Nil**

**C2. Manpower Staffing and Expenditure Details:**

**Particulars of the Manpower working in the project for the year 2014-15 & 2015-16**

| NAME OF THE PERSON | NAME OF THE POST | DATE OF JOINING | DATE OF LEAVING | TOTAL MONTHLY SALARY | TOTAL SALARY PAID DURING THE FINANCIAL YEAR | TOTAL SALARY PAID DURING PROJECT PERIOD |
|---|---|---|---|---|---|---|
| Ms Pronami Baruah | JRF | 10.11.2014 | 30.04.2015 | 12000.00 | 12000.00 | 68400.00 |
| | | | | | | |

**C3. Details of Recurring Expenditure for 2014-15 and 2015-16:**

**Recurring**
**(Head-wise)**
Please see below the consolidated expenditure:

***FINALCONSOLIDATED STATEMENT OF EXPENDITURE***
***(FOR FINAL SETTLEMENT OF ACCOUNTS)***

**1. Title of the Project** : **Molecular and physcico-chemical characterization of selected ginger species from North Eastern region**
**2. Sanctioned Project Cost** : **14.7 lakh**

**3. Revised cost, if any** : **Yes, total released Rs. 10.27 lakh**

**4. Duration of the project** : **March 2011-Jan 2015**

**5. Sanction Order No. & Date** : **BT/33/NE/TBP/2010-25/3/2011**

**6. Date of commencement of Project** : **23/03/2011**

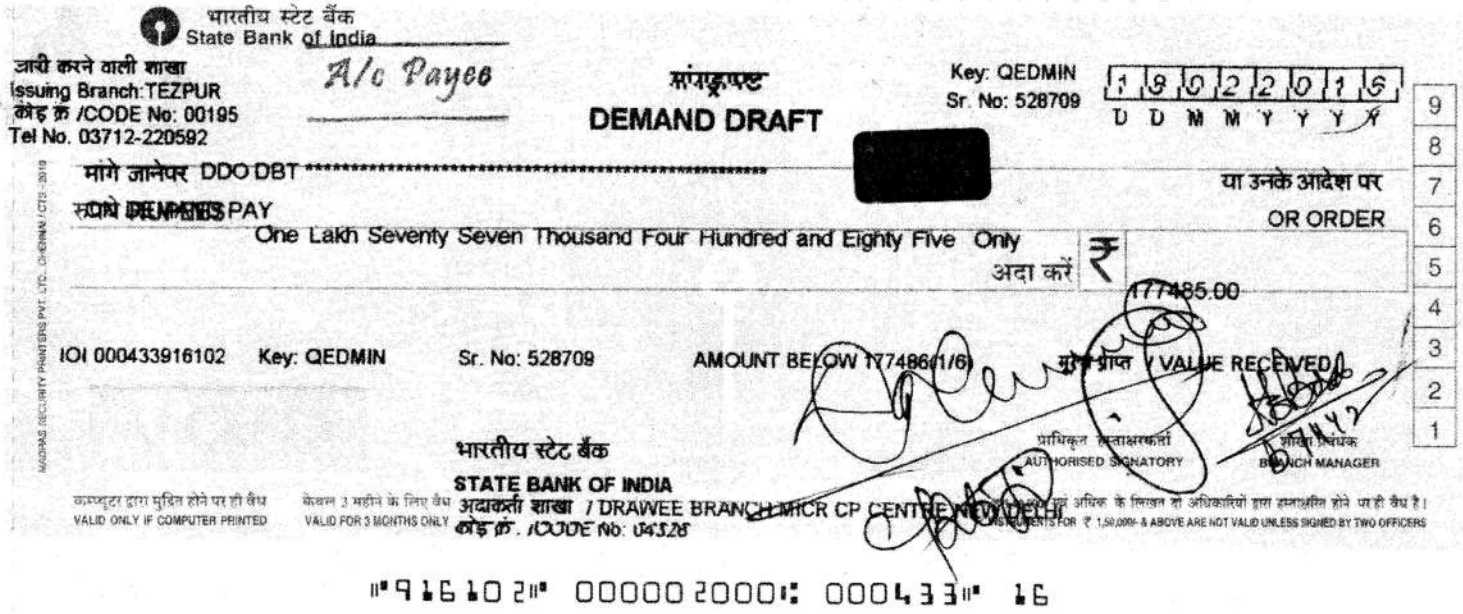
**7. Extension, if any** : **YES**

**8. Date of completion of project** : **20/01/2016**

**Details of grant, expenditure and balance**

| S. No. | Heads | Sanctioned Cost | Year-wise Releases made | | | | | | Year-wise Expenditure incurred | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1st yr (2011-12) | 2nd yr (2012-13) | 3rd Yr (2013-14) | 4th Yr (2014-15) | 5th yr (2015-16) | Total | 1st yr (2011-12) | 2nd yr (2012-13) | 3rd Yr (2013-14) | 4th Yr (2014-15) | 5th yr (2015-16) | Total | Balance |
| A. Non-recurring pageno.- | | | | | | | | | | | | | | | |
| | Equipments | 150000.00 | 150000.00 | 0.0 | 0.00 | 1.5 lakh has been converted in to various recurring heads in this year by DBT. An extra 1.45 lakh was given for manpower only | 0.00 | 0.00 | 0.0 | 0.0 | 0.00 | 1.5 lakh has been converted in to various recurring heads in this year by DBT. An extra 1.45 lakh was given for manpower only | 0.0 | | 0.0 |
| B. Recurring | | | | | | | | | | | | | | | |
| 1. | Manpower | | 250000.00 | 124000.00 | | 145000.00 + 31000.00 | | | 124107.00 | 145600.00 | 0.00 | 56400.00 | 12000.00 | | |
| 2. | Consumables | | 50000.00 | 49000.00 | | 15000.0 | | | 49039.00 | 25448.00 | 0.00 | 172216.00 | 0.00 | | |
| 3. | Travel | | 50000.00 | 50000.00 | | 25000.00 | | | 62397.00 | 12341.00 | 0.00 | 0.00 | 0.00 | | |
| 4. | Contingency | | 40000.00 | 19000.00 | | 29000.00 | | | 28653.00 | 9011.00 | 19869.00 | 1184.00 | 0.00 | | |
| 5. | Overhead | | 50000.00 | 50000.00 | | 50000.00 | | | 50000.00 | 50000.00 | 0.00 | 0.00 | 31250.00 | | |
| | **Total** | | **440000.00** | **292000.00** | | **295000.00** | | | **314196.00** | | | | | | |
| | **Grand Total (A+B)** | | **590000.00** | **292000.00** | **0.00** | **295000.00** | **0.00** | **1027000.00** | **314196.00** | **242400.00** | **19869.00** | **229800.00** | **43250.00** | **849515.00** | 177485.00 |

[Signature(s) of the Investigator(s)]



भारतीय स्टेट बैंक
State Bank of India

जारी करने वाली शाखा
Issuing Branch: TEZPUR
कोड क्र /CODE No: 00195
Tel No. 03712-220592

A/c Payee

मांगपत्रपत्र
DEMAND DRAFT

Key: QEDMIN
Sr. No: 528709

1 8 0 2 2 0 1 6
D D M M Y Y Y Y

मांगे जानेपर DDO DBT ********** या उनके आदेश पर

रुपये [redacted] PAY OR ORDER

One Lakh Seventy Seven Thousand Four Hundred and Eighty Five Only

अदा करें ₹ 177485.00

IOI 000433916102 Key: QEDMIN Sr. No: 528709 AMOUNT BELOW 177486(1/6) मूल्य प्राप्त / VALUE RECEIVED

प्राधिकृत हस्ताक्षरकर्ता
AUTHORISED SIGNATORY

शाखा प्रबंधक
BRANCH MANAGER

भारतीय स्टेट बैंक
STATE BANK OF INDIA
अदाकर्ता शाखा / DRAWEE BRANCH: MICR CP CENTRE NEW DELHI
कोड क्र. /CODE No: 04528

कम्प्यूटर द्वारा मुद्रित होने पर ही वैध
VALID ONLY IF COMPUTER PRINTED

केवल 3 महीने के लिए वैध
VALID FOR 3 MONTHS ONLY

1,50,000/- & ABOVE ARE NOT VALID UNLESS SIGNED BY TWO OFFICERS

MADRAS SECURITY PRINTERS PVT. LTD., CHENNAI / CTS - 2010

⑈916102⑈ 00000 2000⑆ 000433⑈ 16

## Utilisation Certificate

(for the financial year ending **31st March 2016**)

1. Title of the Project/Scheme: Molecular Molecular and physico-chemical characterization of selected ginger species from North Eastern region
2. Name of the Organisation: Tezpur University
3. Principal Investigator: Dr Sudip Mitra
4. Deptt. of Biotechnology sanction order No. & date of sanctioning the project: Letter No. BT/33/NE/TBP/2010 DT 25/3/11

| | | |
|---|---|---|
| 5. | Amount brought forward from the previous financial year quoting DBT letter No. & date in which the authority to carry forward the said amount was given: | Rs. 220735.00 |
| 6. | Amount received from DBT during the financial year (*please give No. and dates of sanction orders showing the amounts paid)*: | NIL |
| 7. | Other receipts/interest earned, if any, on the DBT grants: | N/A |
| 8. | Total amount that was available for expenditure during the financial year (Sl. Nos. 5,6 and 7): | Rs. 220735.00 |
| 9. | Actual expenditure (excluding commitments) incurred during the financial year (statement of expenditure is enclosed): | Rs. 43250.00 |
| 10. | Unspent balance refunded, if any *(Please give details of cheque No. etc.):* | ***Rs 177485.00*** |
| 11. | Balance amount available at the end of the financial year: | Rs. 0.00 |
| 12. | Amount allowed to be carried forward to the next financial year vide letter No. & date: | N/A |

1. Certified that the amount of **Rs. 43250.00** mentioned against col. 9 has been utilised on the project/scheme for the purpose for which it was sanctioned and that the balance of **Rs. 177485.00** remaining unutilized at the end of the year has been surrendered to Govt. (vide No._____ dated_____) /will be adjusted towards the grants-in-aid payable during the next year.

2. Certified that I have satisfied myself that the conditions on which the grants-in-aid was sanctioned have been duly fulfilled/are being fulfilled and that I have exercised the following checks to see that the money was actually utilised for the purpose for which it was sanctioned.

Kinds of checks exercised: 1. (Cash Book) 2. (Ledgers) 3. (Vouchers) 4. (Bank Statements)

Sudip Mitra

**(PROJECT INVESTIGATOR)**

Dr. Sudip Mitra
Assistant Professor
Department of Environmental Science
Tezpur University, Assam-784028, India

**(FINANCE OFFICER)** 29.1.16
Finance Officer
Tezpur University

**(HEAD OF THE INSTITUTE)**

*(To be countersigned by the DBT Officer-in-charge)*

Registrar
Tezpur University

*Annexure A*

## Manpower Staffing Details (In the financial year wise manner)

| NAME OF THE PERSON | NAME OF THE POST | DATE OF JOINING | DATE OF LEAVING | TOTAL MONTHLY SALARY | TOTAL SALARY PAID DURING THE FINANCIAL YEAR | TOTAL SALARY PAID DURING PROJECT PERIOD |
|---|---|---|---|---|---|---|
| Ms Pronami Baruah | JRF | 10.11.2014 | 30.04.2015 | 12000.00 | 12000.00 | 68400.00 |
| | | | | | | |

Sudip Mitra

**(Signature of Principal Investigator)**

Dr. Sudip Mitra
Assistant Professor
Department of Environmental Science
Tezpur University, Assam-784028, India

29-01-16

**(Signature of Accounts Officer)**

Finance Officer
Tezpur University

**(SIGNATURE OF HEAD OF THE INSTITUTE)**

*Registrar*
*Tezpur University*

**Appendix C**

## Statement of Expenditure referred to in Para 9 of theUtilization Certificate

Showing grants received the Department of Biotechnology and the expenditure incurred during the period from 1st April 2015 to 31st March 2016.

NAME OF THE PROJECT "MOLECULAR AND PHYSICO-CHEMICAL CHARECTERIZATION OF SELECTED GINGER SPECIES FROM NORTH EASTERN REGION"

SANCTION No & DATE LETTER NO. BT/33/NE/TBP/2010 DT 25/3/11

| ITEM APPROVED | Unspent Balance Carried forward from previous year | Grants Received from DBT during the year | Other Receipts/interest earned if any, on the DBT grants | Total Col (2+3+4+) | Expenditure (excluding commitments) incurred during the year | Balance (5-6) | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| **NON RECURRING** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| EQUIPMENT | | | | | | | |
| **RECURRING** | | | | | | | |
| HUMAN RESOURCE | 223893.00 | 0.00 | 0.00 | 223893.00 | 12000.00 | 211893.00 | |
| CONSUMABLE | -132703.00 | 0.00 | 0.00 | -132703.00 | 0.00 | -132703.00 | |
| TRAVEL | 50262.00 | 0.00 | 0.00 | 50262.00 | 0.00 | 50262.00 | |
| CONTINGENCY | 29283.00 | 0.00 | 0.00 | 29283.00 | 0.00 | 29283.00 | |
| OVERHEADS | 50000.00 | 0.00 | 0.00 | 50000.00 | 31250.00 | 18750.00 | |
| **Total** | **220735.00** | **0.00** | **0.00** | **220735.00** | **43250.00** | **177485.00** | |

Sudip Mitra

**(PROJECT INVESTIGATOR)**

Dr. Sudip Mitra
Assistant Professor
Department of Environmental Science
Tezpur University, Assam-784028, India

**(HEAD OF INSTITUTE)**
*Registrar*
*Tezpur University*

29-01-16

**(FINANCE OFFICER)**
Finance Officer
Tezpur University