

## FINAL REPORT FOR PROJECTS

1. **Title of Project** : **Development of active packaging film from food processing wastes**
2. **Sanction No.** : **Agri. Engg. 27(23)/ 2015-AE**
3. **Date of Start** : 01<sup>st</sup> February, 2016
4. **Date of Termination** : 31<sup>st</sup> January, 2018
5. **Institution's Name** : Tezpur University (A Central University)  
Place : Napaam, Tezpur  
District : Sonitpur  
State : Assam  
Dept./ Div. Name : Food Engineering and Technology,  
Actual Location : Tezpur University, Napaam, Assam
6. **Principal Investigator**  
Name : Dr. Laxmikant Shivnath Badwaik  
Designation : Assistant Professor  
Div./ Section : Food Engineering and Technology  
Address : Tezpur University, Napaam, Assam
7. **Co- Investigator**  
Name : Dr. Sankar C. Deka  
Designation : Professor  
Div./ Section : Food Engineering and Technology  
Address : Tezpur University, Napaam, Assam

### 8. Objectives :

- To investigate the suitability of various food processing wastes for the development of biopolymer/ composite packaging film.
- To evaluate the effects of different processing treatments on properties of the film forming suspensions and films.
- To develop active packaging film and its application on food products.

### 9. Duration of Project:

0	2	Yrs	0	0	Months	0	0	Days
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**10. Total cost of the Project: Rs. 22.58 Lakhs**

Recurring :Rs. 7,58,810.00

Pay of Officers :Rs. 4,56,793.00

Year : 2016-18 (2 Years)

Name of Post	Pay scale	No. of Post	Total Expenditure (Rupees)
Scientist	---	---	---
Junior Research Fellow	---	---	---
Senior Research Fellow	25,000.00	1 (one)	<b>4,56,793.00</b> (2 <sup>nd</sup> May 2016 to 31 <sup>st</sup> Dec 2018)
Research Associate	---	---	---
Others	---	---	---
<b>Total</b>	---	---	<b>4,56,793.00</b>

Year	Pay of Officers	Pay of Establishment	TA	Other allow	PF	Contingencies	Total Expenditure (Rupees)
2015-16	Nil	Nil	Nil	Nil	Nil	Nil	00.00
2016-17	2,70,194.00	Nil	Nil	6,169.00 (HRA)	Nil	Nil	2,76,363.00
2017-18 (01/04/17 to 16/06/17)	63,333.00 (Ms. Prarthana Dutta)	Nil	Nil	Nil	Nil	Nil	63,333.00
2017-18 (24/08/17 to 31/12/17)	1,06,452.00 (Mr. Purba Prasad Borah)	Nil	Nil	10,645.00 (HRA)	Nil	Nil	1,17,097.00
						<b>TOTAL</b>	<b>4,56,793.00</b>

Non-recurring								
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Year	Recurring	Non- Recurring	Total (Rupees)
<b>Fund Received</b>			
2015-16	2,50,000.00	5,00,000.00	7,50,000.00
2016-17	2,52,000.00	10,00,000.00	12,52,000.00
2017-18	2,56,000.00	Nil	2,56,000.00
<b>TOTAL</b>	<b>7,58,000.00</b>	<b>15,00,000.00</b>	<b>22,58,000.00</b>
<b>Total Expenditure</b>			
2015-16	Nil	Nil	00.00
2016-17	4,95,080.00	14,99,190.00	19,94,270.00
2017-18	2,63,730.00	Nil	2,63,730.00
<b>TOTAL</b>	<b>7,58,810.00</b>	<b>14,99,190.00</b>	<b>22,58,000.00</b>
<b>Balance Amount</b>			
<b>TOTAL</b>	<b>Nil</b>	<b>Nil</b>	<b>Nil</b>

<b>11. Total amount Sanctioned</b> (In case of extension)	Nil	--	--	--	--	--	--	--
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<b>12.Total amount spent</b>	2	2,	5	8,	0	0	0.	00
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### 13. Results of Practical/ Scientific value:

- Different food processing wastes were evaluated for their suitability for developing packaging film.
- Potato peel and sweet lime pomace were selected and successfully utilized for developing biopolymer film.
- Effect of ultrasound and high pressure treatment on sweet lime peel and mustard meal based biopolymer film is also studied.
- The essential oil from sweet lime (*Citrus limetta*) peel was extracted using vacuum-assisted solvent free microwave extraction.
- Effect of ultrasound pre-treatment followed by microwave extraction on yield of essential oil was studied and it showed the significant effect on yield of essential oil.
- The extracted oil was incorporated in sweet lime pomace based film. The film showed the effective antimicrobial properties.
- The active film was applied on fish fillet and their quality changes were studied. The film was comparable with polyethylene in many aspects with added antimicrobial activity.
- The study will provide information to industry, academia and different departments of governments for effective utilization of food industry wastes.

### 14. Papers published:

1. Borah, P. P., Das, P., & Badwaik, L. S. (2017). Ultrasound treated potato peel and sweet lime pomace based biopolymer film development. *Ultrasonics Sonochemistry*, 36, 11-19.  
(NAAS Rating 2016: 10.32; Impact Factor: 4.556)

### Manuscript submitted:

1. Effect of ultrasound and high pressure treatment on sweet lime peel and mustard meal based biopolymer film
- 2.

### Paper presented at Scientific meetings:

1. Paper presented on “*Food Processing Waste as a Source of Valuable Compounds for Package Development: A Review*” in National Seminar on Trends and Innovation in Food Processing Technology: Prospects and Challenges at Department of Food Engineering and Technology, Tezpur University, Assam held on February 09-10, 2017.

**Manuscript under preparation:**

1. Effect of microwave, ultrasound and high pressure treatment on the yield and quality of pectin extracted from peels of sweet lime, orange.
2. Vacuum-assisted solvent free microwave extraction of essential oil from sweet lime peel
3. Enhancement of shelf life of fish fillet with application of packaging film added with essential oil of sweet lime peel

**15. Detailed Objectives/Technical Programme/ activity wise Progress Report (to be annexed)**

The detail Technical Programme wise progress report is attached with this report (Annexure-I)

Signature



Name: Laxmikant Shivnath Badwaik

(Principal Investigator)

Designation: Associate Professor

Date : 15-06-2018

**16. Comments of the project Co-ordinator / Referee:**

**7. Remarks of the Council:**

**GFR 12 – A**

[(See Rule 238 (1))]

**FORM OF UTILIZATION CERTIFICATE  
FOR AUTONOMOUS BODIES OF THE GRANTEE ORGANIZATION**UTILIZATION CERTIFICATE FOR THE YEAR 2017-2018 in respect  
of recurring/non-recurring  
GRANTS-IN-AID/SALARIES/CREATION OF CAPITAL ASSETS

- Name of the Scheme: Extramural Research Project of NDIAN COUNCIL OF AGRICULTURAL RESEARCH (ICAR), New Delhi
- Whether recurring or non-recurring grants: Both (recurring or non-recurring)
- Grants position at the beginning of the Financial year
  - Cash in Hand/Bank : Rs. 7,730/-
  - Unadjusted advances : Nil
  - Total : Rs. 7,730/-
- Details of grants received, expenditure incurred and closing balances: (Actuals)

Unspent Balances of Grants received years [figure as at Sl. No. 3 (iii)]	Interest Earned thereon	Interest deposited back to the Govern- ment	Grant received during the year			Total Available funds (1+2- 3+4)	Expenditure incurred	Closing Balances (5-6)
			Sanction No. (i)	Date (ii)	Amount (iii)			
1	2	3	4			5	6	7
7,730/-	Nil	Nil	Agri. Engg. 27(23)/ 2015- AE	10/08/ 2017	2,56,000/-	2,63,730/-	2,63,730/-	Nil

Component wise utilization of grants:

Grant-in-aid– General	Grant-in-aid– Salary	Grant-in-aid–creation of capital assets	Total
2,63,730/-	Nil	Nil	2,63,730/-

Details of grants position at the end of the year

- Cash in Hand/Bank : Nil
- Unadjusted Advances : Nil
- Total : Nil

  
**Finance Officer**  
**Tezpur University**



Certified that I have satisfied myself that the conditions on which grants were sanctioned have been duly fulfilled/are being fulfilled and that I have exercised following checks to see that the money has been actually utilized for the purpose for which it was sanctioned:

- (i) The main accounts and other subsidiary accounts and registers (including assets registers) are maintained as prescribed in the relevant Act/Rules/Standing instructions (mention the Act/Rules) and have been duly audited by designated auditors. The figures depicted above tally with the audited figures mentioned in financial statements/accounts.
- (ii) There exist internal controls for safeguarding public funds/assets, watching outcomes and achievements of physical targets against the financial inputs, ensuring quality in asset creation etc. & the periodic evaluation of internal controls is exercised to ensure their effectiveness.
- (iii) To the best of our knowledge and belief, no transactions have been entered that are in violation of relevant Act/Rules/standing instructions and scheme guidelines.
- (iv) The responsibilities among the key functionaries for execution of the scheme have been assigned in clear terms and are not general in nature.
- (v) The benefits were extended to the intended beneficiaries and only such areas/districts were covered where the scheme was intended to operate.
- (vi) The expenditure on various components of the scheme was in the proportions authorized as per the scheme guidelines and terms and conditions of the grants-in-aid.
- (vii) It has been ensured that the physical and financial performance under Extramural Research Project of INDIAN COUNCIL OF AGRICULTURAL RESEARCH (ICAR), New Delhi (name of the scheme has been according to the requirements, as prescribed in the guidelines issued by Govt. of India and the performance/targets achieved statement for the year to which the utilization of the fund resulted in outcomes given at Annexure – I duly enclosed.
- (viii) The utilization of the fund resulted in outcomes given at Annexure – II duly enclosed (to be formulated by the Ministry/Department concerned as per their requirements/specifications.)
- (ix) Details of various schemes executed by the agency through grants-in-aid received from the same Ministry or from other Ministries is enclosed at Annexure –II (to be formulated by the Ministry/Department concerned as per their requirements/specifications).

Date: 28-05-2018

Place: Tezpur

Signature

Name: Dr. Laxmikant Shivnath Badwaik

Principal Investigator

Signature

Name: Mr. Bani Pathak

Finance Officer

Signature

Name: Dr. Biren Das

Head of the Organisation

*Registrar*

*Tezpur University*

**FORMAT FOR STATEMENT OF EXPENDITURE  
(for 01/04/2017 to 31/03/2018)**

S. No.	Name of the Budget Head	(Amount in Rs.)					
		Closing balance of 2016-17 (as on 31 <sup>st</sup> March 2017)	Budget for the year during 2017-2018	Releases made during the year 2017-18	Total fund available for 2017-18	Expenditure incurred during 01/04/2017 to 31/03/2018	Closing balance (as on 31/03/2018)
		A	B	C	D (A+C)	E	F (D-E)
<b>1.</b>	<b>Works</b>						
	i. Office Building						
	ii. Minor Works						
<b>2.</b>	<b>Equipments</b>	Nil	Nil	Nil	Nil	Nil	Nil
<b>3.</b>	<b>Information Technology</b>						
<b>4.</b>	<b>Library Books &amp; Journals</b>						
<b>5.</b>	<b>Livestock</b>						
<b>6.</b>	<b>Furniture &amp; Fixtures</b>						
<b>7.</b>	<b>Others (Specify)</b>						
<b>A.</b>	<b>Total-Capital (Grants for creation of Capital Assets) (1 to 7)</b>	Nil	Nil	Nil	Nil	Nil	Nil
<b>1.</b>	<b>Travelling Allowance</b>	Nil	20,000.00	16,774.00	16,774.00	16,774.00	Nil
<b>2.</b>	<b>Research &amp; Operational Expenses</b>						
	i. Chemicals/Glassware etc.	7,730.00	40,000.00	34,796.00	42,526.00	42,526.00	Nil
	ii. Unskilled/semiskilled labour						
	iii. Outsourcing of lab work						
	iv. Vehicle hiring for surveys etc.						
<b>3.</b>	<b>Administrative Expenses</b>						
	A. Infrastructure						
	B. Communication						
	C. Repair & Maintenance						
	D. Others (Specify)						
<b>4.</b>	<b>Miscellaneous Expenses</b>						
	i. HRD						
	ii. Review Workshops/ Meetings/ Trainings						
	iii. Contractual Staff	Nil	1,80,000.00	1,80,430.00	1,80,430.00	1,80,430.00	Nil
<b>5.</b>	<b>Institutional Charges</b>	Nil	24,000.00	24,000.00	24,000.00	24,000.00	Nil
<b>B.</b>	<b>Total- Grant in Aid (General) (1 to 5)</b>	7,730.00	2,64,000.00	2,56,000.00	2,63,730.00	2,63,730.00	Nil
<b>C.</b>	<b>Grand Total (A+B)</b>	7,730.00	2,64,000.00	2,56,000.00	2,63,730.00	2,63,730.00	Nil
	Details of Interest Earned on Short Term Deposits/ Other Receipts, if any, in the project*						
<b>1.</b>	Interest Earned during the period	--	--	--	---	--	--
<b>2.</b>	Other receipts during the period	--	--	--	---	--	--
<b>D</b>	<b>Total Receipts</b>	NIL	NIL	NIL	NIL	NIL	NIL
<b>E.</b>	<b>Closing Balance (as per Cash Book) (C+D)</b>	7,730.00	2,64,000.00	2,56,000.00	2,63,730.00	2,63,730.00	NIL

\*Applicable only for Non-ICAR Units. The amount generated by way of receipts, will be adjusted in future releases.

*Signature of PI*

*Signature*  
Finance Officer  
Tezpur University

*Signature*  
Registrar  
Tezpur University