डॉ. आशुतोष अ. मुरकुटे
निदेशक
Dr. Ashutosh A. Murkute
Director

महात्मा गांधी ग्रामीण औद्योगीकरण संस्थान
Mahatma Gandhi Institute for Rural Industrialization
सुक्ष्म, लघु और मध्यम उद्यम मंत्रालय, भारत सरकार के अधीन राष्ट्रीय संस्थान
A National Institute under Ministry of MSME, Govt. of India

MGIRI/DR/2023-24/712

Date : 27.02.2024

To,

The Director,
S&T Directorate , KVIC
3rd Irla road, Ville Parle (W)
Mumbai

Subject: Submission of Revised Research Project entitled **"Process and Machine development for Banana Fibre based Value-added Products – Non Woven Fabrics and Fibre crafts"** for funding - reg.

Dear Sir,

With reference to the letter S&T/KVIC/HQ/18/4/2023/29623/2023-24/445 dated. 13.02.2024, RCI division of MGIRI is submitting a Revised Research proposal on **"Process and Machine development for Banana Fibre based Value-added Products – Non Woven Fabrics and Fibre crafts "** for consideration by the S&T Directorate of KVIC for funding.

Regards,

27/2/24

(A. A. Murkute)

Enclosed – Project Proposal

मगनवाडी, वर्धा -442001, महाराष्ट्र, भारत
फोन क्र. : 91-7152-253512
Maganwadi, Wardha 442001, Maharashtra, India
Phone No :+91-7152-253512
Email : director.mgiri@gmail.com Website : www. mgiri.org

DIRECTORATE OF SCIENCE & TECHNOLOGY
OFFICE OF THE COMMISSIONER KVI
"Gramodaya" 3, IRLA ROAD, VILE-PARLE (W)
MUMBAI-400056.

I - PART-A

1.	**Name of the Institution / Individual:** Mahatma Gandhi Institute For Rural Industrialization (MGIRI).	
2.	**Institutional Structure/Registration Details:** MGIRI is a premier institute constituted by the ministry of MSME for promotion of rural industrialization in forms of micro and small units. Institute have six major Divisions viz. Bio-processing and Herbal, Rural Chemical Industries, Khadi and Textile, Rural Energy and Infrastructure, Rural Crafts and Engineering and Management and Systems.	
2a	**Legal Status**	Mahatma GandhiInstitute for Rural Industrialization (MGIRI) Wardha is a leading National Institute under the Ministry of MSME, Govt. of India.
2b	**Date of Registration**	4th December 2003
2c	**Registered Address**	Mahatma Gandhi Institute for Rural Industrialization (MGIRI) Maganwadi, Wardha – 442001. Maharashtra
2d	**Office Address/Locations**	Mahatma Gandhi Institute for Rural Industrialization (MGIRI) Maganwadi, Wardha – 442001. Maharashtra Phone: 07152 – 253512/13 Fax: 07152 - 240328 e-mail: director.mgiri@gmail.com
2e	**Affiliated to KVIC**	Yes/No - NA If yes, provide Certificate No. _____ Validity of Certificate _____

3. **Validity date of Registration (in case of NGO's):** NA

4. **Name & Designation of the head of the organization:**
Dr. Ashutosh A. Murkute, Director

5. **Name, Designation & address of the Project Co-Ordinator**:

Project Co-ordinator
Mrs. Uma There,
Sr. Laboratory Assistant
Rural Chemical Industries Division,
Mahatma Gandhi Institute for Rural Industrialization (MGIRI), Maganwadi, Wardha – 442001. Maharashtra.
Email id :umachemist53@gmail.com,

1. **Project Co-Coordinator**
Mr. Vikas Choudhary,
Principle Scientific Officer,
Rural Chemical Industries Division,
Mahatma Gandhi Institute for Rural Industrialization (MGIRI), Maganwadi, Wardha – 442001. Maharashtra.
Email id : vcc1511@gmail.com ,
2. **Project Co-Coordinator**
Mr.Ganesh There,
Technical Assistant
Rural Energy and Infrastructure division
Mahatma Gandhi Institute for Rural Industrialization (MGIRI), Maganwadi, Wardha – 442001. Maharashtra.
Email Id: ganeshthere@gmail.com

6. **Background of the organization**:

(a) Past experience in R & D work in the KVI sector and micro-enterprise and entrepreneurship development need to be given separate sheets (details of work done in other areas need not be given).
Soap, Detergent and its raw material testing kit was developed and disseminated through organizing dissemination training in institute premises during 2008-09, programme was funded by Directorate of S & T, KVIC Mumbai. Training provided to representatives of 18 MDTCs and 3 KVI units. A set of testing provided to all the MDTCs and institutions.

(b) Infrastructure facilities and expertise available (give details).

A well-established R & D and quality control laboratory equipped with advanced analytical equipments are available for conducting various research and quality control activities. A team of qualified employees with very good experience in the concerned field available in MGIRI.

(c) **Details of completed and ongoing projects during the last 3 years.**

Sr. No.	Title of the project	Start date-Completion date	Name and full address of funding agency	Amount sanctioned*	Amount received*
	Nil (There is no KVIC funded project taken during last three years)	-	-	-	-

*Enclose copies of the sanction

7. **District / Area to be taken up for the project:**

Survey work will be conducted in banana Fibre processing units, research centers and Institutes, SFURTI Clusters, PMEGP units, Farmers of India and work will be conducted according to the survey reports. After completion of the project/work the product and process will be disseminated to all parts of the country by organizing dissemination training for trainers.

8. **Location of projects implementation and details thereon.**

All zones of KVIC.

9. **If any developmental activity has been done in the proposed location prior to submission of this proposal by the Project Coordinator or the Organization, the details may be given in brief.** – as Indicated in the project proposal.

10. **Details of infrastructure of the organization in the proposed location.**

Fully equipped with the necessary Infrastructure in the MGIRI Campus.

27/12/24

डॉ. आ. अ. मुरकुटे
निदेशक, एमगिरी, वर्धा.
Dr. A. A. Murkute
Director, MGIRI, Wardha

DIRCTORATE OF SCIENCE & TECHNOLOGY
OFFICE OF THE COMMISSIONER KVI
"Gramodaya"3, IRLA ROAD, VILE-PARLE (W)
Mumbai - 400056.
Proposal for Submission of New R&D project (Year: 2024-25)

1. Title of the Project:

Process and Machine development for Banana Fibres Based Value-added Products – Non- Woven Fabrics and Fibre crafts.

2. Objective of the Study:

The following are the basic objectives for carrying out this project,

a. To develop 100% bio-degradable and environment friendly Non-woven fabrics and Fibre Crafts from banana fibre.
b. To utilize the 100% banana Pseudo stem waste for fibre processing without using any harmful chemicals or polluting the environment by black liquor.
c. To disseminate/ demonstrate the technology to the huge level of Banana Plant cultivators of the North Eastern, South and other part of India.
d. To fulfil the demands of farmers across the country and for widespread development of Fibre processing from agricultural wastages to produce value-added products.
e. To develop potential low-cost machineries for non-woven fabrics.
f. To generate employment opportunities within the value chain, including harvesting, processing, manufacturing, and marketing of value-added products from banana pseudo stems.

3. Justification of Project:

For every cycle of banana fruit production, four times of biomass wastes are also produced. The farmer will usually throw these wastes into lakes and rivers or burn them. Banana plantation occupies a large part of the land, because, after harvesting, the farmer cuts the banana trees and throws away an enormous amount of these stems into the fields, lakes, and rivers or burn them because after harvesting the fruit, there is no significant use of banana trees.

The PCCF Tripura addressed the problem of wastage of Banana Sap, fiber etc at Tripura during discussion and asked MGIRI to take initiative for utilization of banana waste as a resource and value addition to the Banana waste and other products. A banana fibre processing industry (PMEGP Scheme unit) from, Madhya Pradesh also addressed the problems and asked to rend support from MGIRI on banana fibre.

- MGIRI is conducted the survey at SFURTI Cluster, **Jayadev Banana Fibre Extraction cluster at Orissa, Bhubaneshwar, Mangalam Kalpataru Industries, Burhanpur, MP(PMEGP unit) and Banana Research Centre, Jalgaon and farmer of Wardha district**. The purpose of the visit was to identify the technical and financial challenges faced by the cluster, which are engaged in the production of food and crafts related products from banana stem.
- The cluster has highlighted a concern about the low profit margins from their existing products. To address this issue, they are looking to expand and modernize various technologies within their production processes.
- One key factor contributing to their decision to expand and modernize is the vast availability of raw materials, particularly the banana pseudo stem. This suggests that the cluster recognizes the potential of their abundant resources and aims to capitalize on them for sustainable growth.

If the scrapped stems and trunks are utilized, this can lead to a decrease in synthetic fibre production. Banana based products reduces pollution by having lower disposal costs and less agricultural waste entering landfills and rivers. The production of products uses less energy compared to traditional Fibre production as the traditional pulp and Fibre industries are one of the largest sources of energy consumption. The expanding banana fibre market is further supported by its low production cost. Factors contributing to the low production cost include relatively inexpensive banana fibre extraction machinery and ease of operation of these machines by unskilled workers. The fibres are from a renewable source and are biodegradable, they are very much an environment friendly product because of their degradability in nature.

Figure 1 Biomass waste after banana harvesting

Figure 2 100 % Utilization of Banana pseudo stem waste

It is an environment friendly initiative in the banana fibre sector that aims to encourage the use of organic fibre as a cost-effective value-added product in the textile, fibre crafts. Banana stem acts as a very suitable alternative raw material for making Non-Woven Fabrics, Fibre crafts as it contains a very good percentage of cellulose. Cellulose is the main raw material for Fabric making and the stem part of banana trees contains the highest percentage of cellulose and less lignin contents (10-15%). The banana Pseudo-stem shows satisfactory physical properties, such as relatively high tensile strength and stiffness, which indicate its prospect as a promising fibre material.

4. The availability of proposed technology/ intervention in the field/ market, etc.

Several potential applications of this fibre are mentioned, such as the use of this fibre to fabricate rope, placemats, paper cardboard, string thread, tea bags, high-quality textile materials, absorbent, polymer/fibre composites, etc. Banana fibre can also be utilized to develop fabrics with variable weights and thicknesses, depending on which portion of the banana stem the fibre was harvested from.

The technology for Banana based Non-Woven Fabrics are available in the research papers with (60:40) banana/polypropylene but they are not biodegradable.

Hence, MGIRI has taken initiative to develop 100% bio-degradable and environmentally friendly non-woven fabrics and Crafts materials for the generation of additional revenue to banana farmers which they generally throw or burn them.

5. Level of work done so far (Review of literature of the proposed R&D):

We have identified the products made from banana fibres through surveys conducted across the country including SFURTI CLUSTER, PMEGP units, banana research Institute, farmers

1. Table mats, baskets, brooms, purses yoga mats.
2. Sanitary napkins
3. Pickles
4. Health drinks
5. Bio Char

MGIRI developed some samples at the laboratory level and Some encouraging results have been found during development, which were shared with the experts in the consultative workshop organized by MGIRI on problem identification in Fibre and handmade industries. Hence, this proposal could help for development of value-added products from banana fibre as well as to develop the low-cost machinery. These machines could be helpful for many pulps and Fiber processing industries and may go for field trials & develop new banana plant-based products enterprises at medium and small levels.

Figure 3 Non-Woven Fabric from banana Fibre

6. Relevance, usefulness and justification of the proposed work to KVI sector terms of economy, efficiency, productivity, quality, raw material utilization, etc:

This proposal not only for enterprise development, it is also a paradigm for cluster-based development and rural economic growth from agricultural waste. It will utilize the 100%

banana pseudo stem waste for fibre processing without using any harmful chemicals or polluting the environment by black liquor. The development of value-added products from banana pseudo stem is most in-demand technology worldwide to utilize the abandoned Fibre waste. Thus, important may be given on this for widespread development and to meet the demands of people across the country by implementing with the support of KVIC. This will help the farmers to earn more money and will motivate them to increase their interest in cultivating banana crops.

The banana-waste-based enterprise is possible to be started with minimum capital as raw material cost is low and the machinery can be fabricated using simple technology or procured in India. Therefore, the farmers target should be only the extraction of fibre from banana tree or collect the fibre directly from banana cultivators and can start from any segment like banana fibre-based Non-Woven Fabrics manufacturing, and handicrafts or any kind of items those have discussed above. Also, they can setup a well-equipped modern industry to manufacture all kinds of banana fibre-based products sequentially.

7. Time Schedule for implementation of Project/ Methodology:

Time required for implementation & successful completion of the project is of two years. Research and development work will be carried out during 1st year of project after sanction and release of funds. During the second year of project, dissemination and demonstration training and workshops will be conducted in various Pulp and Fibre processing sector. Necessary changes will be incorporated based on the feedback received from end user of Banana Fibre units. The final report will be submitted on completion of the project period with justification to support the decision of widespread implementation of this technology in Fibre processing for value added product.

Name of Project	FY-2024-25				FY-2026-27			
Process and Machine development for Value-added Products from Banana Fibre – Non-Woven Fabric and Fibre Crafts.	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	A							
			B					
					C			
							D	
Budget, Rs in lakhs	**7.65 lakhs**				**7.35 lakhs**			

A	1. Field Visit to identify the problems and present status of raw material utilization and availability. 2. Collection of Banana stems from farmers and Procurement of raw materials after the field study. Designing the suitable process to convert the Banana stem into Fibre. 3. procurement of basic machineries and supporting machineries. 4. Procurement of spare parts and accessories.
B	1. Optimization of Process and Method. 2. Evaluation and Standardization. 3. Fabrication of machineries and purchasing of supporting machineries.
C	1. Evaluation and validation of process and machineries.
D	1. Dissemination, Demonstration, training, workshops and Field Trials. 2. Analysing and improving the technology based on the feedback received after field trials. 3. Preparation of final report on the technology. 4. Pilot project proposal for next level.

8. Potential areas identified for promotion of micro- enterprises:

The main potential areas of banana fibres are Textile, Fibre and Pulp Industries and handicrafts sector. It can also be used for making doormats, ropes, handicrafts, Table cloths, cushion covers, curtains, rugs, neckties, bags in textile sector. Natural fiber industry can provide employment opportunities to millions of people, mostly to small farmers and cottage industries. In India, banana being an industry of major importance to the national economy, can also significantly contribute to an additional income to the farmers. The abundantly available agricultural waste produces renewable fibre from banana plant and can become a profitable resource for farmers.

Agro-based fibres, particularly banana fibre, are the most promising and sustainable alternative to natural fibres because of the difficulties in growing fibre-yielding crops and the difficulties in meeting the demands of the growing population.

9. Scientific & technical interventions envisaged:

The feasible and suitable process and machineries will be developed for rural entrepreneurs and farmers and the machineries will be very easy to operate for unskilled person.

10. Training programme envisaged:

Entrepreneurship development program and skill development training will be provided to beneficiaries of before implementation of technology in their units. Workshop will be organized at MGIRI on the developed technology at the second year of the project.

11. Linkages envisaged:

Various reputed organizations in the respective technology fields will be contacted for support and evaluations through conferences and seminars. Technical certifications and standardization will be considered to be obtained from relevant agencies. All the beneficiaries will be given technical support of MGIRI.

12. Follow-up mechanism envisaged to tap fullest benefit of R&D:

Under the dissemination/technology transfer through micro entrepreneurs, improvements in processing and new value addition will be incorporated. A thorough follow up and evaluation study system will be developed to assess the technology feasibility done under the project.

13. Expected outcome of the Project:

1. Process and Machine development of Non- Woven Fabrics and Fibre crafts.
2. Value addition from the banana waste from these will strengthen the livelihood and additional income to the farmers and banana processing units.
3. This will support in making new business models in the rural sector on banana value addition.

14. Exit Strategy:

Following is the exit strategy under this project –

1) Conduct of field dissemination Fibre processing and machineries to introduce the value-added products from banana crop waste.
2) All the expected village industry beneficiaries across the country will be considered for the plan to disseminate the above technology.
3) Next level Pilot project may be planned for further dissemination of technology for the benefit of SME's of Banana fibre industries in the country.
4) Involving NGO's and agencies in these areas to extend technology dissemination support.

15. Project Budget:

Approximate Project Cost: Rs.15.00 lakhs

SN	Particulars	Expenditure for I year in Lakhs)	Expenditure for II year in Lakhs)
1.	Non-recurring	**1.60**	**1.35**
2.	Recurring	**5.16**	**5.16**
	Total	6.76	6.51
	Institutional Overhead and IRG (@13%)	0.89	0.84
	Total	**7.65**	**7.35**

Budget details:

(i) Non-recurring

SN	Particulars	Expenditure for I year in Lakhs)	Expenditure for II year in Lakhs)
1.	Machineries & Equipment	1.50	1.25
3.	Equipment augmentation	0.10	0.10
	Total	**1.60**	**1.35**

(ii) Recurring

SN	Particulars	Expenditure for I year in Lakhs)	Expenditure for II year in Lakhs)
1.	Manpower / Salaries, Consultancy and Professional Charges	5.16	5.16
	Total	**5.16**	**5.16**

Note: If there is a need, it is requested to allow PI of this project to exchange funds internally.

ANNEXURE- III
(Ref : S.O. No. 1739, Dt: 29.06.2015)

CERTIFICATE

ENDORSEMENT FROM THE HEAD OF THE INSTITUTION

1. We have gone through the terms and conditions of the S&T grant agreed to abide by and enter into an Agreement/MOU with OCKVI for implementing the S&T scheme.

2. We have neither obtained nor intended to obtain financial assistance from any other agencies, amounting to double funding.

3. We undertake to submit progress reports, statement(s) of accounts, utilization certificates, etc. as required.

4. Certified that Dr/Shri/Smt/Kum. Uma Thete ..... is the Project Coordinator of the proposed S&T Project. The Project Coordinator will assume the responsibility of completion of the project.

- Certified that the hardware, other basic facilities and such other administrative support required as per terms and conditions of the grant, will be extended to the Coordinator(s) throughout the duration of the project.

- Our agency assumes to undertake the complete financial and other management responsibilities of the project, and will ensure compliance with the terms and conditions laid down.

5. Certified that the Society/Organization will extend benefits of the said S&T projects to the targeted beneficiaries of KVI activities only.

6. If any of the above statements found to be incorrect by the OCKVI at any point of time, the organization takes the responsibility to refund the entire amount released by OCKVI along with 10% interest as per GFR norms.

Date :

Place :

27/12/24

Name & Signature of the Head of Agency
डॉ. आ. अ. मुरकुटे
निदेशक, एमगिरी, वर्धा.
Dr. A. A. Murkute
Director, MGIRI, Wardha