



**CHHATTISGARH STATE MINOR FOREST PRODUCE
CO-OPERATIVE FEDERATION, LTD.**

"Van Dhan Bhawan" Sector 24, Atal Nagar, Nawa Raipur (C.G.)
E-mail: mspfed.cg@nic.in Website: www.cgmfpfed.org

No./MFP Fed./Project/PMU/2023/7015

Raipur, Date: 30/05/2023

To,

3. Dr. Sumit kumar singh (PI),
Assistant Professor
School of Biochemical Engineering
IIT (BHU) Varanasi U.P.
E-mail Id: sumit.bce@iitbhu.ac.in
4. Dr. Pranjal Chandra (Co-PI),
Assistant Professor
School of Biochemical Engineering
IIT (BHU) Varanasi U.P.
E-mail Id: pranjal.bce@iitbhu.ac.in

Sub: Submission of research project proposal titled "Development of all-natural silk protein anthocyanin based restorative hair-dye formulation".

- Ref:**
1. Letter No. /MFP Fed./project/PMU.2023/2325 Dated 14.02.2023.
 2. Letter From IIT (BHU) Dated 18.04.2023.
 3. Letter No. /MFP Fed./project/PMU.2023/6120 Dated 10.05.2023.
 4. Letter From IIT (BHU) Dated 16.05.2023

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With reference to the above cited letters regarding the projects proposal "Development of all-natural silk protein anthocyanin based restorative hair-dye formulation". Submitted project has been approved by cited letter no. 03. We have received copy of MoU. Singed copy of MoU is here with attached for necessary action.

It is to be clarified once again that the following condition will be adhered while duly implementation of project.

1. IIT (BHU) will assist in the marketing of the product for CGMFP.
2. No other cost will be engaged other then the sanctioned cost.

The first installment will be released soon, kindly proceed accordingly.

With Regards,

Encls : Copy of MoU

(B. Anand Babu)

Additional Managing Director (D)
CGMFP Federation, Raipur

G.M.F.P. Fed. Raipur

31 MAY 2023

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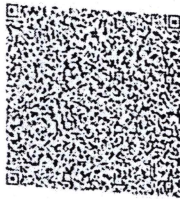
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Government of Uttar Pradesh

e-Stamp

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 ACC Name:
 ACC Code:
 ACC Address:
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Certificate No. : IN-UP05481207287039V
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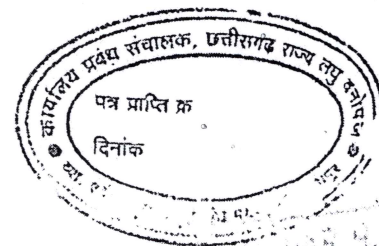


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AMD (T)

MD

2/10/23
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**Memorandum of Understanding (MoU) for the
Development of All-natural silk protein anthocyanin
based restorative hair-dye formulation**

Indian Institute of Technology (Banaras Hindu University) Varanasi is an Institute of national importance created by an Act of the Parliament through the Institutes of Technology (Amendment) Act, 2012 vide Gazette Notification dated 29.06.2012., acting through the Principal Investigator (PI) of this project, having its office at School of Biochemical Engineering, P.O. IIT(BHU) Varanasi, Varanasi, U.P.- 221005, India, hereinafter referred to as "IIT (BHU)," of the FIRST PART.

AND

Chhattisgarh State Minor Forest Produce Co-operative Federation Limited, Van Dhan Bhawan, Sector-24 Nava Raipur, Atal Nagar, RAIPUR (C.G.), registered under Chhattisgarh Cooperative Societies Act, 1960 and acting through its **Managing Director (Trade)**, here-in-after called the "CGMFP," which expression shall include its assigns and successors, of the SECOND PART.

The aforesaid institutions are hereinafter referred to individually as the "Party" and collectively as the "Parties."

Whereas IIT(BHU) is one of the premier institutes to provide meaningful education, to conduct original research of the highest standard, and to provide leadership in technological innovation for the industrial growth of the country. IIT(BHU) imparts and undertakes cutting-edge research in various areas of science; engineering, design; management, and humanities

Whereas

- (i) the "CGMFP" is the three-tier Co-operative organization created to promote the trade and development of Minor Forest Produce in the interest of MFP gatherers, on co-operative pattern. The main tasks of the "CGMFP" are:
 - a. Collection and trade of Tendu leaves
 - b. Implementation of many socio-economic welfare schemes for the tendu leaves gatherer families like footwear distribution, scholarship schemes for education of their children, Insurance schemes for the members of the Tendu leaves gatherers; distribution of profit from the trade of Tendu leaves in the form of differed wages etc.
 - c. Promotion of Minor Forest Produce based processing units

threat to human health.

- Finally, the presently available hair dyes cost around Rs 1500-8500/- Considering the simple extraction and purification procedure, we aim to bring down the cost of the proposed product in the range of Rs 800-1000/- thereby providing good market incentives. A copy of the Proposal is appended on Annexure A to this Agreement.

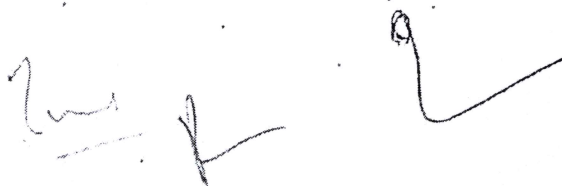
- (iii) The "CGMFP" has, through its letter ("Sanction letter") No./MFP Fed./Project/PMU/2023/6120 dated 10/05/2023 sanctioned the Project subject to the Cost approved in the Sanction Letter. A copy of the Sanction Letter is appended in Annexure B to this Agreement.
- (iv) Whereas Dr. Sumit Kumar Singh, School of Biochemical Engineering (hereinafter referred to as "IIT (BHU) Principal Investigator") and Dr. Pranjal Chandra, School of Biochemical Engineering (hereinafter referred as "IIT (BHU) Co-Principal Investigator") will initiate the Project. He and his research team at IIT (BHU) will execute the obligations of non-disclosure of Confidential Information received from "CGMFP".

Whereas the Parties desire to record the broad terms and conditions that are jointly accepted and agreed to in this MoU as contained hereunder.

This MoU shall be deemed to commence (effective date) from 01/06/2023.

1. Definition

- "CGMFP" know-how shall mean and include all know-how of methods, materials, software, designs, patterns, formats, proprietary technical literature, and information developed, owned, and provided by the "CGMFP," which are required for the project.
- IIT(BHU) know-how shall mean and include all know-how of methods, materials, software, designs, patterns, formats, proprietary technical literature, and information developed, published, or otherwise owned and provided by IIT(BHU), which are required by the project.
- "CGMFP" personnel shall mean the personnel or research and development engineers of the "CGMFP" deputed for the project
- IIT(BHU) Principal investigator research team shall comprise of the Principal Investigator and the co-Investigator participating in the project(s).



term by written agreement signed by both the parties.

The project work may be terminated by either party by giving the other party a written notice of 60 days, mentioning sufficient cause for such termination. However, both parties will ensure that the provisions of this MoU shall continue to apply to all activities in progress until their completion. Clauses relating to the intellectual Contractors, Governing Laws and Conflict Resolution and clause 16 and 17 shall survive the termination or expiration of this MoU.

6. Milestones

The actionable milestones to be achieved by IIT(BHU) are appended in the Annexure-A to this MoU.

7. Payment

Financial specifications (Project cost consultancy/honorarium) will be as per the cost sanctioned by CGMFP Federations through letter No. No./MFP Fed./Project/PMU/2023/6120 dated 10/05/2023 (Annexed as Annexure B) to this MoU. All Cheques/RTGS will be drawn in favor of Registrar, IIT(BHU) Varanasi. The payment shall be made by the "CGMFP" within 15 calendar days from the date of receipt of the invoice from IIT(BHU).

The payment shall be disbursed in the following manner:

First Installment	Initial- at the signing of the agreement	60%
Second Installment	On 4 th Month	20%
Third Installment	On 8 th Month	20%

8. Confidentiality:

- a. Confidential Information includes all communication of information disclosed in documentary or tangible form between the Parties, including oral, written, and machine- readable forms, pertaining to the above, which is indicated as confidential. In the case of such information disclosed orally or visually, the Disclosing Party shall confirm in writing the fact and general nature of each disclosure within (30) days after it is made.

- g. The confidential information shall remain the sole property of the Disclosing party.
- h. The obligation of non-disclosure of the confidential information shall survive for 3 years after the expiry/termination of this MoU.

9. Limitation of Liability

Neither Party, nor any of their affiliates nor their or their affiliates respective directors, officers, employees, subcontractors, or agents shall be liable to the other Party for any special, incidental, indirect, or consequential damages (including, but not limited to, contract, negligence and tort liability) in connection with or arising out of this MoU.

10. Publicity:

Neither party shall use the name of the other party or its employees in any advertisement, press release, or publicity with reference to this MoU without written approval of the other party, except for necessary government disclosures.

11. Independent Contractors:

For the purposes of this MoU, the parties hereto are independent contractors and nothing contained in this MoU shall be construed to place them in relationship of partners, principal and agent, employer/ employee or joint ventures.

12. The parties agree that this MoU constitutes a legal, valid and binding agreement of each party, and is enforceable against each party in accordance with its terms.

13. Amendment:

Any amendment or variation to this MoU shall be made by a written MoU between the parties.

14. Governing Laws and Conflict Resolution

This MoU shall be constructed, governed, interpreted, and applied in accordance with the laws of India. The Parties shall attempt in good faith to resolve promptly any dispute arising out of or relating to this MoU by negotiation. If the matter cannot be resolved in the normal course of business, within ten (10) days after the dispute arises, any interested Party shall give the other Party written notice of any such dispute not resolved, after which the dispute shall be referred to

DATE:

For and on behalf of,

Chhattisgarh State Minor Forest Produce
Cooperative Federation Limited

Signature

Name:

Designation:

महाप्रबंधक
छ.ग. राज्य लघु वनोपज सहकारा संघ मध्यप्रदेश
वन सन भवन, सेक्टर-24,
भुवनेश्वर, जिला-रायपुर (छ.ग.)

For and on behalf of,

Indian Institute of Technology (Banaras
Hindu University) Varanasi

Signature

Name: Dr. Sumit Kumar Singh (PI)

Designation: Assistant Professor

School of Biochemical Engineering, IIT (BHU)

Signature:

Name: Dr. Pranjal Chandra (Co-PI)

Designation: Associate Professor

School of Biochemical Engineering, IIT (BHU)

Dr. Pranjal Chandra

Associate Professor

School of Biochemical Engineering

Indian Institute of Technology (BHU) Varanasi
Varanasi 221005, Uttar Pradesh

WITNESSES: Mrs. Gyan Chandra

S.E. (Procuring)

CGMFP Federation, Raipur
Chhattisgarh.

Anuradha Swarnkar

SE (PMO)

CGMFP Federation

Raipur (CG)

Signature:

Name: Prof. Vikash Kumar Dubey

Designation: Coordinator, School of Biochemical Engineering, IIT (BHU)

Coordinator

संयोजक
संयोजक
School of Biochemical Engg.
भारतीय प्रौद्योगिकी संस्थान-1
Indian Institute of Technology
(भारतीय प्रौद्योगिकी) वाराणसी-221005
(I.I.T.) Varanasi-221005

Signature:

Name: Prof. Vikash Kumar Dubey

Designation: Dean (R & D), IIT (BHU)

प्रमुख (संशोधन एवं विकास)
Dean (Research & Development)
भारतीय प्रौद्योगिकी संस्थान (भारतीय प्रौद्योगिकी)
Indian Institute of Technology (IIT) Varanasi-221005

Annexure A

Project proposal

On

**Development of all-natural silk protein-Anthocyanin-based
restorative hair-dye formulation**

Submitted to

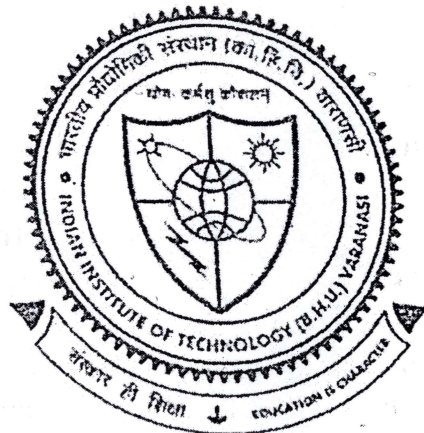
**Chhatisgarh State Minor Forest Produce (Trading
and Development) Co-operative Federation Ltd.**

by

Dr. Sumit Kumar Singh, Ph.D. (PI)

Dr. Pranjal Chandra, Ph.D (Co-PI)

School of Biochemical Engineering



Indian Institute of Technology

(BHU)Varanasi- 221005

Background: Hair is an important component of the body with great physiological importance for both men and women. The spurt in several cosmetic alterations of hair, like coloring and straightening, bears testimony to their importance across cultures and fashion. However, these cosmetic activities utilize harsh chemical processes that often damage the normal structure of the hair shaft. For example, the bleaching process utilizes strong oxidizing agents that destroy the disulfide bonds of keratin (80% of human hair is made up of keratin and is responsible for the hair strength, flexibility, durability, and functionality), resulting in significantly altering hair mechanical and surface properties. Thus, there is a huge demand for the development of new hair protective products, and currently, the hair cosmetic Industry is focused on alternative solutions like proteins and protein-based materials that could be eventually developed into topical applications.

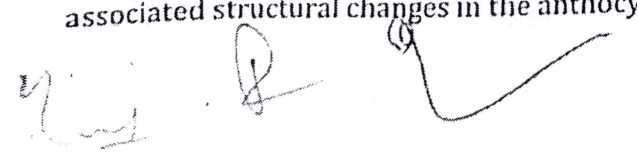
Benefits of Protein-based formulations: Proteins can create a suitable environment for healthy hair because of the amphoteric and buffering properties that enable them to bind water with the horny skin and its annexes.

Proposed Product: We propose to develop an all-natural protein-Anthocyanin based hair-dye using silk fibroin, pectin, anthocyanin, and coconut oil as the base ingredient. The silk fibroin will be extracted using Rolly Tasar Cocoon and/or Daba Cocoon, while the pectin will be sourced from any plant available (citrus/ legume plants preferred) at the CGMPFED. Anthocyanin will be extracted from fresh Jamun fruits (Pulp and seeds) sourced at the CGMPFED. Coconut oil can be purchased or can be used from CGMPFED, if available. About eight different formulations will be prepared with the following composition:

Silk Fibroin_x Pectin_y (SF_xPy)

Where $x = 70, 80, 90, 95\%$; $y = 0, 5, 10, 20$ mg/ml. The protein solutions will be prepared in phosphate buffer saline (PBS 1x) PH 7.4 to a final concentration of 10 mg/ml with 0.5% (v/v) of virgin coconut oil. Further, these solutions will be processed to form silk fibroin-based particles using a high-pressure homogenization process. The purpose of making silk-fibroin-particles is to take advantage of the particle's physical characteristics like size and zeta-potential that can be fine-tuned to influence the particle's affinity to hair and their deposition pattern, which in turn could render different degrees of improvement and restoration of human hair properties.

Once these protein-based particles are synthesized, the next task will be to extract anthocyanin from Jamun fruits. The extraction will be accomplished by screening a number of solvents that gives the highest yield and purity. The dyeing of silk particles will then be carried out by mixing the appropriate proportions of anthocyanin and silk particles while adjusting the PH of the mixture to get the desired hair color. The importance of PH control during dyeing is to induce structural changes in the structure of anthocyanin as a function of PH that could impart red, purple, blue, or black color. The associated structural changes in the anthocyanin as a function of PH conditions is shown



	8. Weighing balance 9. pH meter 10. Liquid N2 tank	
PI's department	1. Akta pure 2. Flow cytometer 3. qPCR 4. FTIR 5. -80 deep freezer 6. Texture Analyzer 7. HPLC	All functional and available on departmental shared basis in central instrumental facility
Other Institute(s) in the region	1. LC-MS/MS 2. UF/DF 3. Nano-particle tracking analyzer 4. Malvern Zetasizer	Available on pay-and-use basis.

c) Budget:

S.No	Items	Year 1	Justification
1.	Equipment	Rs 2,50,000/-	Will be used for the extraction and analysis of anthocyanins and silk protein
2.	Manpower 1. Project Staff	Rs 3,36,000/-	The Project Staff will be hired following the institute norms and will be paid a consolidated amount of INR 28000 pm for 12 months
2.	Consumables	Rs 14,00,000/-	Consumables such as plastic ware (tips, pipettes, beakers, Eppendorf and cylinders), glassware, cell lines, culture media, antibiotics, HPLC columns, HPLC vials, fetal bovine serum, HPLC analytical standards etc. will need to be purchased for the proposed work.
3.	Contingency	Rs 5,00,000/-	Several Physicochemical tests such as will need to be outsourced, when not available in the department or institute. Further, the fund will be used for purchasing stationery items, printing, lab, and equipment maintenance and travel for project-related work etc.
	Total cost of the project	Rs 24,86,000/-	

Annexure B



CHHATTISGARH STATE MINOR FOREST PRODUCE CO-OPERATIVE FEDERATION, LTD.

"Van Dhan Bhawan" Sector 24, Atal Nagar, Nawa Raipur (C.G.)

E-mail: mfpfed.cg@nic.in

Website: www.cgmsfpfed.org

No./MFP Fed./Project/PMU/2023/6120

Raipur, Date: 20/05/2023

To,

1. Dr. Sumit kumar singh (PI),
Assistant Professor
School of Biochemical Engineering
IIT (BHU) Varanasi U.P.
E-mail Id: sumit.bce@iitbhu.ac.in
2. Dr. Pranjal Chandra (Co-PI),
Assistant Professor
School of Biochemical Engineering
IIT (BHU) Varanasi U.P.
E-mail Id: pranjal.bce@iitbhu.ac.in

Sub: Sanction of research project proposal titled "Development of all-natural silk protein anthocyanin based restorative hair-dye formulation" (Revised) - reg.

- Ref:
1. Letter From IIT (BHU) Dated 05.12.2022.
 2. Letter No. /MFP Fed./project/PMU.2023/2325 Dated 14.02.2023.
 3. Letter From IIT (BHU) Dated 18.04.2023

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The CGMFP Federation is glad to give its consent for undertaking R&D proposal on development of all natural silk protein anthocyanin based restorative hair-dye formulation reference to the above. Accordingly an agreement can be signed between the MFP Federation and IIT (BHU) at mutually agreed conditions of agreement condition. Revised project outlay can be as proposed by you and will be paid as below :-

Revised Project Cost

S.NO.	Item	Cost (Rs.)
1	Equipments	2,50,000.00
2	Manpower	3,36,000.00
3	Consumables	14,00,000.00
4	Contingency	5,00,000.00
Total		24,86,000.00

No overhead charges will be paid by CGMFP to IIT (BHU) for above project. Project duration shall be one year and effective from date of signing of MoU. The payment will paid in three installment (1st 60% at the signing the agreement, 2nd 20% on fourth month of project 3rd 20% on eight month of the project). All the terms & Conditions are applicable as per agreement.

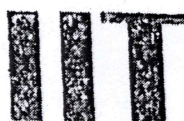
Hence you are requested to the proceed with R&D activity immediately duly sending signed MoU on Rupees 100/- stamp paper for taking further action.

With Regards,

(B. Ananda Babu)
Additional Managing Director (D)
CGMFP Federation, Raipur



भारतीय
प्रौद्योगिकी
संस्थान
वाराणसी



INDIAN
INSTITUTE OF
TECHNOLOGY
BARIHAT, BHUPAL NAGAR, BHUPAL NAGAR
VARANASI-221005

Dr. Sumit K. Singh
Assistant Professor

5th December, 2022

To,
The Managing Director
Chhattisgarh State Minor Forest Produce Co-operative Federation Limited
Raipur

Dear Sir,

Subject: Submission of research project proposal titled "Development of all-natural silk protein anthocyanin based restorative hair-dye formulation"


I am very pleased to enclose the project proposal cited in the subject above for your review and consideration for funding. Per our presentation to the committee on 19/10/2022, we would develop a natural hair-dye product using Silk and Jamun procured from CGMFP. The proposed product will be:

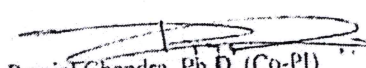
1. Natural, non-toxic, and non-carcinogenic with no potential hazards to human health upon application on hair.
2. Exhibit semi-permanent retention on hair after application
3. Significantly lower cost than existing market products, enhancing market competitiveness.

We will be happy to provide any other clarifications or information if required.

Thank you for your time and consideration.

Sincerely,


Sumit Kumar Singh, Ph.D. (PI)
Assistant Professor,
School of Biochemical Engineering
Indian Institute of Technology (IIT)
Varanasi- 221005.


Pranjal Chandra, Ph.D. (Co-PI)
Associate Professor,
School of Biochemical Engineering
Indian Institute of Technology (IIT)
Varanasi- 221005



**CHHATTISGARH STATE MINOR FOREST PRODUCE
CO-OPERATIVE FEDERATION LTD.**

"Van Dhan Bhawan"

Secotr 24, Atal Nagar, Nava Raipur (C.G.) Phone: (0771) 2513100

E-mail: mfpfed.cg@nic.in Website: www.cgmpfed.org

No./MFP Fed./Project/PMU/2023/2325

Nava Raipur, Date: 14/02/2023

To

Dr. Sumit K. Singh,
Assistant Prof.,
School of Biochemical Engineering
Indian Institute of Technology (BHU),
Varanasi (U.P.) 221 005

Sub: Submission of Research Project Proposal titled "Development of All-Natural
Silk Protein Anthocyanin Based Restorative Hair-Dye Formulation"

Ref: Your Letter dated 5th December, 2022.

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With reference to your letter cited above, this is to inform you that the above Research Project Proposal is under consideration. However, the Federation is eager to know the modalities and possibilities for commercial production and marketing of the product, once it is developed, with Third-Party and sharing of revenue with Federation duly getting the raw materials from Federation.

Hence, you are requested to send a brief note on the above and details of interested Third-Parties, if any, so as to take further action regarding the Project Proposal.

With regards,

8/4/23
(B. Ananda Babu)
Additional Managing Director
(Development)
CGMFP Federation, Nava Raipur



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प्रौद्योगिकी
संस्थान
भारतीय प्रौद्योगिकी संस्थान



INDIAN
INSTITUTE OF
TECHNOLOGY
BANARAS HINDU UNIVERSITY

Dr. Sumit Kumar Singh (Ph.D.)
Assistant Professor
School of Biochemical Engineering
IIT (BHU) Varanasi U.P. 221005 India
Email: sumit.bce@iitbhu.ac.in
Web: <https://iitbhu.ac.in/dept/bce/people/sumitbce>

18th April 2023

To,
The Managing Director
Chhattisgarh State Minor Forest Produce Co-operative Federation Limited (CGMFP)
Raipur

Dear Sir,

Subject: Submission of research project proposal titled "Development of all-natural silk protein anthocyanin based restorative hair-dye formulation"

Ref: Your letter dated 14th February 2023

Thank you for considering the above research project proposal. As requested in the letter, I am happy to provide the modalities and commercial marketing of the proposed product as under:

1. Modalities of product development:

The proposed work is about the development of a product for the coloration of human hair, with provisions for the development of dyes that are obtained from natural sources (Rally Tasar Cocoon and/or Daba Cocoon) and Jamun fruits (Pulp and seeds) sourced from CGMFP.

Responsibility of CGMPFED:

- The "CGMFP" will provide the raw materials (Rally Tasar Cocoon/ Daba Cocoon) to the PI/Co-PI and its know-how which may be deemed necessary for the project

Responsibility of PI/Co-PI (IIT BHU):

- The PI/ Co-PI will be responsible for pursuing the R&D of the hair dye formulation development and its optimization.
- Conducting relevant assays to characterize and screen formulations.
- Will assist in the marketing of the product for CGMFP.

2. Commercialization of the product:

The future of the natural hair dye market in India is very promising as there exist several opportunities in supermarkets, department stores, pharmacies, health and beauty stores, and e-retail markets.

Laboratory for Engineered Therapeutics (LET), School of Biochemical Engineering, IIT (BHU),
Varanasi- 221005, Uttar Pradesh, India