

ਮਹਾਰਾਜਾ ਰਣਜੀਤ ਸਿੰਘ ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ, ਬਠਿੰਡਾ

**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY**

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Bathinda-151001 (Punjab), India

# REPORT

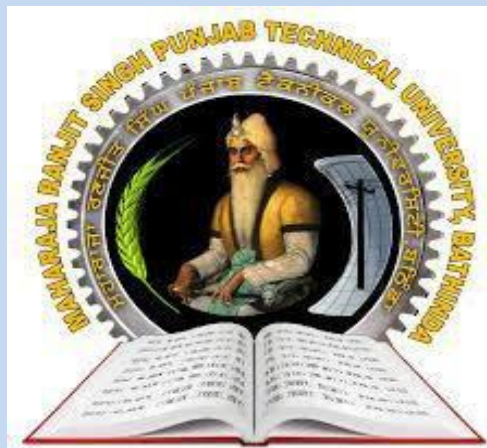
## RESEARCH AND INNOVATION AWARDS



**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY**

Bathinda-151001 (Punjab), India

# RESEARCH AND INNOVATION AWARDS



**2023-2024**

**INTERNAL QUALITY ASSURANCE CELL  
MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY  
BATHINDA 151001**

*MRSPTU-Social Outreach and extension activities*

# RESEARCH AND INNOVATION AWARDS

## Prepared by:

1. Prof. (Dr.) Ashish Baldi, Director IQAC
2. Prof. (Dr.) Anupam Kumar, Dean R&D
3. Dr. Ankita Kataria, Department of Food Science & Technology, MRSPTU, Bathinda
4. Ms. Reetu, Department of Food Science & Technology, MRSPTU, Bathinda

## Inputs by:

Dr. Ashish Baldi, Director, IQAC

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*Year 2024*

INTERNAL QUALITY ASSURANCE CELL

# **RESEARCH AND INNOVATION AWARDS**

S.No.	Title of the innovation	Name of the Awardee	Name of the Awarding Agency with contact details	Year of Award	Category- institution/teacher/research scholar/student
1	Effect of Fermentation on the Thermal Properties, Pasting Profile, Crystallinity and Rheological Behaviour of Legumes	Barinderjeet Singh Toor	Punjab Agricultural University, Ludhiana, India	2024	Teacher
2	Characterization and Evaluation of Sweet Potato (Ipomoea batatas L.) Starch for Tablet Formulation	Hardeep Singh	Guru Kashi University, Talwandi Sabo, Punjab, India.	2024	Research Scholar
3	Advancing Legume Nutrition: Innovations in Ultrasonication for Enhanced RS Content	Reetu Palthania	Guru Kashi University, Talwandi Sabo, Punjab, India.	2024	Research Scholar
4	Tablet Formulation from Little Millet Starch: Characterization and Evaluation	Shweta Chaturvedi	Guru Kashi University, Talwandi Sabo, Punjab, India.	2024	Research Scholar
5	Tablet Formulation from Kodo Millet Starch: Characterization and Evaluation	Shweta Chaturvedi	Punjab Agricultural University, Ludhiana, India	2024	Research Scholar
6	Tablet Formulation from Barnyard Millet Starch: Characterization, Evaluation and In Vitro Drug Delivery	Shweta Chaturvedi	Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India	2024	Research Scholar
7	Antioxidative, Functional and Morphological Characteristics of Thermally Processed Kodo Millet (Paspalum	Ankita Kataria	Punjab Agricultural University, Ludhiana, India	2024	Teacher

	Scrobiculatum)				
8	Physico-chemical, Functional and Rheological Properties of Legume Starches: An Overview	Reetu Palthania	Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India	2023	Research Scholar
9	Application of 3D Printing Technology on Starch Based Product: A review	Reetu Palthania	Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India	2023	Research Scholar
10	The Role of Physical Modification in Tailoring Starch for Functional Food Applications	Reetu Palthania	Lovely Professional University, Jalandhar, Punjab, India	2024	Research Scholar
11	Modified starches: A novel approach to the 3D Food Printing	Hardeep Singh	Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India	2023	Research Scholar
12	Tablet formulation from potato starch: Characterization and Evaluation	Hardeep Singh	Punjab Agricultural University, Ludhiana, India	2024	Research Scholar
13	Formulation and evaluation of buckwheat (Fagopyrum esculentum moench) and maize (Zea mays L.) Starch incorporated paracetamol tablets	Hardeep Singh	Lovely Professional University, Jalandhar, Punjab, India	2024	Research Scholar
14	Tablet Formulation from Foxtail Millet Starch: Characterization and Evaluation	Shweta Chaturvedi	Lovely Professional University, Jalandhar, Punjab, India	2024	Research Scholar
15	Tablet Formulation	Shweta Chaturvedi	Chaudhary Devi Lal University,	2023	Research Scholar

	from Starches: Characterization and Evaluation in vitro drug delivery		Sirsa, Haryana, India		
16	Extraction, analysis and application of carotenoids and polyphenols from kinnow peel	Kiranbeer Kaur	Punjab Agricultural University, Ludhiana, India	2024	Research Scholar
17	Fungal fermentation of proso millet: An effective approach to enhance the functionality	Kiranbeer Kaur	Lovely Professional University, Jalandhar, Punjab, India	2024	Research Scholar
18	Advancements in Legume Processing: A Comprehensive Review of Non-Conventional and Emerging Technologies	Kiranbeer Kaur	MDPI	2024	Research Scholar
19	Effect of Processing on the Nutritional Characteristics and Functionality of Kodo Millet	Khushneer Kaur	National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana	2023	Student
20	The Critical Realization of 21st Century – Mainstreaming of Millet Processing	Amandeep Kaur	National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana	2023	Student
21	Nano-starches: an advanced approach of nanotechnology in food industry	Mehak Gambhir and Ramandeep Kaur	Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India	2023	Student
22	Effect of Flaxseed on Rheological Properties of Wheat Flour Dough	Meetali and Navneet Kaur	Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India	2023	Student
23	Design, print and consume the	Khushneer Kaur and	Maharaja Ranjit Singh Punjab	2023	Student

	technology behind 3d printed chocolates	Amandeep Kaur	Technical University, Bathinda, Punjab, India		
24	IETE Biman Bihari Sen Memorial Award for Research Activity	Dr.Munish Kumar	IETE	2024	Teacher
25	Shiv Nath Rai Kohli Mid Career Best Scientist Award for Research Activity	Dr.Munish Kumar	Panjab University, Chandigarh	2024	Teacher
26	Levraging	Mohit Kumar	Department of Pharmaceutical Sciences and Drug Research, Punjabi University Patiala	2024	PhD scholar
27	Multidrug combination tablets for paediatric tuberculosis using 3D printing technology	Shubham Singh	Integral University, Lucknow	2024	PhD scholar
28	effervescent and confectionary based novel formulations for	Anisha Kumari	Society of Materials & Mechanical Awards	2023	M. pharm
29	Development, optimization and formulation of nanostructured lipid carriers of mycophenolate mofetil using formulation by design	Zahanat Muneer Mir	Society of Materials & Mechanical Awards	2023	M. pharm
30	Formulation and evaluation of simvastatin loaded hydrogel sheet for wound healing	Dikshant	Society of Materials & Mechanical Awards	2023	M. pharm
31	probiotic Nanomaterials: Unlocking The Potential of nanotechnology	Parul Thakur	Society of Materials & Mechanical Awards	2023	M. pharm
32	Gut Microbiome and Diabetes	Arshdeep Singh	Society of Materials &	2023	B.pharm



	Mellitus		Mechanical Awards		
33	Turmeric Milk Formulation: Development and Characterization	Chandan Middha	Society of Materials & Mechanical Awards	2023	B. pharm
34	from pixel to patients : 3D printing's vital role in healthcare	Shivam Bhadauria	Society of Materials & Mechanical Awards	2023	B. pharm
35	Comparative Analysis of mango, barnyard millet and maize starches in pharmaceutical tablet formulations : physiochemical characteristics and drug release profiles	Shiv Kumar	Society of Materials & Mechanical Awards	2023	B.pharm
36	Best Studio Project ( North Region)	Charlina J Dutta	TRANSPARENCE 18.0 (SAINT GOBIN)	2024	Student
37	B V Doshi Memorial Scholarship	Priya	National Association of Students of Architecture	2023	Student

*MRSPTU-Social Outreach and extension activities*



NATIONAL SYMPOSIUM

on

FOOD PROCESSING 4.0: INNOVATION AND SUSTAINABILITY

APRIL 30, 2024

ORGANIZED BY

DEPARTMENT OF FOOD SCIENCE & TECHNOLOGY

PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA-141004, PUNJAB, INDIA



# Certificate

## BEST POSTER

This is to certify that the following has been awarded as **Best Poster** at National Symposium on “Food Processing 4.0: Innovation and Sustainability” held on April 30, 2024 at Punjab Agricultural University, Ludhiana, Punjab, India.

Effect of Fermentation on the Thermal properties, Pasting profile,  
Title Crystallinity and Rheological behaviour of Legumes

Authors Barinderjeet Singh Toor, Amanjeet Kaur and Jaspreet Kaur

Affiliation MRSPTU, Bathinda.

*Savita Sharma*

Dr Savita Sharma  
Head, Food Science and Technology

*Isaakulata*

Dr CS Aulakh  
Dean, College of Agriculture

*AS Dhatt*

Dr AS Dhatt  
Director of Research



# CERTIFICATE

IS PRESENTED TO

Mr. Hardeep Singh

from Maharaja Ranjit Singh Punjab Technical University, Bathinda, PB

has participated/ presented a Lead Paper/ Oral/ Poster Presentation entitled,

Characterization and Evaluation of Sweet Potato . . . . .Tablet formulation

co-authored with Chandan Garg, Shweta Chaturvedi, Barinderjeet Singh Toor, Ankita Kataria and  
awarded with 2<sup>nd</sup> position in the International Conference Kawaljit Singh Sandhu

“CURRENT INNOVATIONS AND TECHNOLOGICAL ADVANCES IN AGRICULTURE AND ALLIED SCIENCES” (CITAAS- 2024)

jointly organised by Guru Kashi University, Talwandi Sabo (ICAR accredited) &

Just Agriculture Education Group & ISASTR, Noida

held on 29-31 August, 2024 at GKU, Talwandi Sabo.

*RP Saharan*

Dr. RP SAHARAN  
Dean Agriculture (FOA), GKU

*V.S. Pahil*

DR. V.S. PAHIL  
Advisor to Chancellor, GKU

*D.P.S. Badwal*

Dr. D.P.S. BADWAL  
Founder & CEO, Just Agriculture

*Sushila Hooda*

Dr. SUSHILA HOODA  
President, ISASTR, Noida



# CERTIFICATE

IS PRESENTED TO

REETU PALTHANIA

from Maharaja Ranjit Singh Punjab Technical University, Bathinda

has conferred with Best Oral Presentation/Poster Presentation Award for presenting on (2nd Position)

Advancing legume Nutrition: Innovations in Ultrasound for Enhanced RS Content

in the International Conference

"CURRENT INNOVATIONS AND TECHNOLOGICAL ADVANCES IN AGRICULTURE AND ALLIED SCIENCES" (CITAAS- 2024)

jointly organised by *Guru Kashi University, Talwandi Sabo (ICAR accredited) &*

*Just Agriculture Education Group & ISASTR, Noida*

held on 29-31 August, 2024 at GKU, Talwandi Sabo.

Dr. RP SAHARAN  
Dean Agriculture (FOA), GKU

DR. V.S. PAHIL  
Advisor to Chancellor, GKU

Dr. D.P.S. BADWAL  
Founder & CEO, Just Agriculture

Dr. SUSHILA HOODA  
President, ISASTR, Noida

JA/B/004



# CERTIFICATE

IS PRESENTED TO

SHWETA CHATURVEDI

from Maharaja Ranjit Singh Punjab Technical, University Bathinda

has conferred with Best Oral Presentation/Poster Presentation Award for presenting on (2nd Position)

Tablet formulation from Little millet starch: Characterisation & Evaluation

in the International Conference

"CURRENT INNOVATIONS AND TECHNOLOGICAL ADVANCES IN AGRICULTURE AND ALLIED SCIENCES" (CITAAS- 2024)

jointly organised by *Guru Kashi University, Talwandi Sabo (ICAR accredited) &*

*Just Agriculture Education Group & ISASTR, Noida*

held on 29-31 August, 2024 at GKU, Talwandi Sabo.

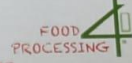
Dr. RP SAHARAN  
Dean Agriculture (FOA), GKU

DR. V.S. PAHIL  
Advisor to Chancellor, GKU

Dr. D.P.S. BADWAL  
Founder & CEO, Just Agriculture

Dr. SUSHILA HOODA  
President, ISASTR, Noida

JA/B/002



NATIONAL SYMPOSIUM  
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FOOD PROCESSING 4.0: INNOVATION AND SUSTAINABILITY  
APRIL 30, 2024

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PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA-141004, PUNJAB, INDIA

## Certificate

### BEST ORAL PRESENTATION

This is to certify that the following has been awarded as **Best Oral Presentation** at National Symposium on "Food Processing 4.0: Innovation and Sustainability" held on April 30, 2024 at Punjab Agricultural University, Ludhiana, Punjab, India.

Title Tablet Formulation from Kodo Millet Starch: Characterization & Evaluation

Authors Shweta Chaturvedi, Ashdeep Singh, Hardeep Singh, Ankita Kataria,  
Basinderjeet Singh Toor and Ranajit Singh Sandhu.

Affiliation MRSPTU, Bathinda Punjab

Savita Sharma

Dr Savita Sharma  
Head, Food Science and Technology

CS Aulakh

Dr CS Aulakh  
Dean, College of Agriculture

AS Dhatt

Dr AS Dhatt  
Director of Research



Ref. No.: 1121/CO/23

**INTERNATIONAL CONFERENCE ON ADVANCEMENTS & FUTURISTIC  
TRENDS IN MECHANICAL & MATERIALS ENGINEERING**

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**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY, BATHINDA**



**&  
SOCIETY OF MATERIALS & MECHANICAL ENGINEERS**  
[Regd. under Societies Registration Act (XXI of 1860), Regn. No. 324 of 2015-16]



**Technical Presentation Award**

This is to certify that *Shweta Chaturvedi*....., has  
presented a research paper during International Conference on "Advancement and Futuristic Trends in  
Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: *Tablet Formulation from Bannayand Millet Starch: Characterization,  
Evaluation and in Vitro Drug Delivery*

General Secretary

*1st Position*

  
Convener

OP-PHM-05

**ANTIOXIDATIVE, FUNCTIONAL AND MORPHOLOGICAL  
CHARACTERISTICS OF THERMALLY PROCESSED KODO MILLET  
(*Paspalumscrobiculatum*)**

Ankita Kataria\*, Simran Sidhu, Barinderjeet Singh Toor and Kawaljit Singh Sandhu

Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab

\*Corresponding author Email ID: [ankitakataria92@gmail.com](mailto:ankitakataria92@gmail.com)

The surge in the demand of millets or nutriceals due to their high nutritive values and significant health-promoting properties has led to increasing research interest. In this study, kodo millet (*Paspalumscrobiculatum*), raw and processed – soaking, microwave roasting, steaming, soaking + microwave roasting and soaking + steaming – were evaluated for their total phenolic (TPC) and total flavonoid contents (TFC), radical scavenging activities, functional and morphological properties. Raw kodo millet contained appreciable quantities of TPC (0.61 mg gallic acid equivalents/g) and TFC (25.96 mg quercetin equivalents/g). Processed kodo millet exhibited significantly ( $p < 0.05$ ) elevated TPC and TFC with the highest values being observed upon steaming (213 %) and microwave roasting (13.52 %). However, ABTS<sup>•+</sup> scavenging activity was observed to reduce significantly upon processing and DPPH<sup>•</sup> scavenging activity exhibited varying trend. Processing significantly ( $p < 0.05$ ) enhanced the density (both bulk and true), water and oil absorption capacities but reduced the water solubility index. The changes in the swelling and emulsification properties exhibited fluctuations upon processing using the individual and combination treatments. Structural characterisation via Fourier transform infrared spectrum revealed the enhanced hydrogen bonding, hydrophilic and lipophilic interactions, and hydroxyl groups which suggested the improvement in the functionality of processed kodo millet. Morphological characteristics revealed the degradation of starch granules and denaturation of proteins upon processing. Processing of kodo millet is recommended to improve the antioxidative and functional properties and therefore enhance its potentiality for utilisation as functional ingredients for imparting health and technological benefits.

**Keywords:** Nutriceal, Kodo millet, Processing, Antioxidant activity, Technobiofunctionality



Ref. No.: 1096/CO,|23

**INTERNATIONAL CONFERENCE ON ADVANCEMENTS & FUTURISTIC TRENDS IN MECHANICAL & MATERIALS ENGINEERING**

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[Regd. under Societies Registration Act (XXI of 1860), Regn. No. 324 of 2015-16]



**Technical Presentation Award**

This is to certify that *Reetu*....., has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: *Physico-chemical, functional and rheological properties of legume Starches: An Overview*

*[Signature]*  
General Secretary

*1st Position*

*[Signature]*  
Convener



Ref. No.: 1113/CO,|23

**INTERNATIONAL CONFERENCE ON ADVANCEMENTS & FUTURISTIC TRENDS IN MECHANICAL & MATERIALS ENGINEERING**

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[Regd. under Societies Registration Act (XXI of 1860), Regn. No. 324 of 2015-16]



**Technical Presentation Award**

This is to certify that *Reetu*....., has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: *Application of 3D Printing Technology on Starch Based Product: A review*

*[Signature]*  
General Secretary

*1st Position*

*[Signature]*  
Convener





SCHOOL OF AGRICULTURE

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Certificate No. 349562

### Certificate of Merit

This is to certify that Mr./Ms./Dr. Reetu Palthania of Maharaja Ranjit Singh Punjab Technical University, Punjab stood Second in Poster Presentation on The role of physical modification in tailoring starch for functional food application in the International Conference on Recent Trends in Smart and Sustainable Agriculture for Food and Nutritional Security (SSAFNS) held from 27th September, 2024 to 28th September, 2024 organized by School of Agriculture, Lovely Faculty of Technology and Sciences, at Lovely Professional University, Punjab.

Date of Issue : 28-09-2024  
Place : Phagwara (Punjab), India

Prepared by  
(Administrative Officer-Records)

Joint Organizing Secretary/HOS  
School of Agriculture

Head of Faculty  
LPU



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Ref. No.: 1120 / CO1 / 23

### INTERNATIONAL CONFERENCE ON ADVANCEMENTS & FUTURISTIC TRENDS IN MECHANICAL & MATERIALS ENGINEERING

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[Regd. under Societies Registration Act (XXI of 1860), Regn. No. 324 of 2015-16]



### Technical Presentation Award

This is to certify that ...*Hardeep Singh*....., has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: *Modified Starches: A Novel Approach to the Conventional 3D Food Printing*

General Secretary

Convener



NATIONAL SYMPOSIUM  
on  
FOOD PROCESSING 4.0: INNOVATION AND SUSTAINABILITY



APRIL 30, 2024

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PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA-141004, PUNJAB, INDIA

# Certificate

## POSTER PRESENTATION

The participation and Poster Presentation of the following is certified at National Symposium on "Food Processing 4.0: Innovation and Sustainability" held on April 30, 2024 at Punjab Agricultural University, Ludhiana, Punjab, India.

Title Tablet formulation from Potato Starch: Characterization and Evaluation

Presenter "HARDEEP SINGH"

Affiliation Maharaja Ranjit Singh Punjab Technical University, Bathina, Punjab, India

Dr Savita Sharma  
Head, Food Science and Technology

Dr CS Aulakh  
Dean, College of Agriculture

Dr AS Dhatt  
Director of Research



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Certificate No. 349563

## Certificate of Merit

This is to certify that Mr./Ms./Dr. Hardeep Singh of Maharaja Ranjit Singh Punjab Technical University, Punjab stood Third in Poster Presentation on Formulation and evaluation of Buckwheat (*Fagopyrum esculantum* Moench) and Maize paracetamol tablets in the International Conference on Recent Trends in Smart and Sustainable Agriculture for Food and Nutritional Security (SSAFNS) held from 27th September, 2024 to 28th September, 2024 organized by School of Agriculture, Lovely Faculty of Technology and Sciences, at Lovely Professional University, Punjab.

Date of Issue : 28-09-2024  
Place : Phagwara (Punjab), India

Prepared by  
(Administrative Officer-Records)

Joint Organizing Secretary/HOS  
School of Agriculture

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APRIL 30, 2024

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# Certificate

## POSTER PRESENTATION

The participation and Poster Presentation of the following is certified at National Symposium on "Food Processing 4.0: Innovation and Sustainability" held on April 30, 2024 at Punjab Agricultural University, Ludhiana, Punjab, India.

Title *Extraction, analysis and application - - - - - kinnow peel*

Presenter *"KIRANBEER KAUR"*

Affiliation *Dept. of Food Science and Technology, Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab*

*Savita Sharma*

Dr Savita Sharma  
Head, Food Science and Technology

*CS Aulakh*

Dr CS Aulakh  
Dean, College of Agriculture

*AS Dhatt*

Dr AS Dhatt  
Director of Research



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Certificate No. 349545

# Certificate of Merit

This is to certify that Mr./Ms./Dr. Kiranbeer Kaur of Maharaja Ranjit Singh Punjab Technical University, Punjab stood Third in Oral Presentation on Fungal fermentation of Proso millet : An effective approach to enhance the functionality in the International Conference on Recent Trends in Smart and Sustainable Agriculture for Food and Nutritional Security (SSAFNS) held from 27th September, 2024 to 28th September, 2024 organized by School of Agriculture, Lovely Faculty of Technology and Sciences, at Lovely Professional University, Punjab.

Date of Issue : 28-09-2024  
Place : Phagwara (Punjab), India

Prepared by  
(Administrative Officer-Records)

Joint Organizing Secretary/HOS  
School of Agriculture

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The 5th International Electronic  
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28–30 October 2024 | Online | [Foods2024.sciforum.net](https://Foods2024.sciforum.net)

## Certificate of Participation

This certificate is hereby presented to the attendee  
named below in recognition of their active participation.

**Kiranbeer Kaur**



*S. Tochev*  
Stefan Tochev  
Chief Executive Officer



## Effect of Processing on the Nutritional Characteristics and Functionality of Kodo Millet

Simran Sidhu<sup>1</sup>, Khushneer Kaur<sup>1\*</sup>, Ankita Kataria<sup>1</sup>, Barinderjeet Singh Toor<sup>1</sup> and Kawaljit Singh Sandhu<sup>1</sup>

<sup>1</sup>Department of Food Science and Technology, Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India (151001)

\*Presenting author: [khushneerkaur1@gmail.com](mailto:khushneerkaur1@gmail.com)

### Abstract

Kodo millet (*Paspalum scrobiculatum*), a minor millet, is considered a super grain since it is drought resistant and, a rich source of proteins, minerals, fibre and phytochemicals thereby exhibiting health benefits. The investigation aimed to process kodo millet using soaking, roasting, steaming and combinations of these treatments followed by their characterization. Processing exhibited significant ( $p < 0.05$ ) variations in the compositional, functional, antioxidative, spectroscopic and morphological characteristics. Protein and fat contents increased significantly to the extent of 7.55 and 44.7% respectively, however carbohydrate and ash contents exhibited different trends. The highest bulk density and true density were observed in the kodo millet processed using a combination of soaking and steaming (0.6971 g/ml) and steaming (0.9214 g/ml) respectively as compared to raw (0.8558 g/ml) kodo millet, implying that steamed kodo millet flour is better aligned and packed which could be advantageous during transportation. The major impact of processing was observed in the functional properties wherein water absorption capacity, oil absorption capacity, swelling power and swelling solubility increased significantly by 93.16, 41.12, 49.46 and 87.59% respectively after processing, but WSI decreased by 49.5%. Emulsification properties also varied significantly wherein soaked kodo millet exhibited highest emulsion activity (6.314%) and emulsion stability (7.894%). Total phenolic content increased significantly after processing, but total flavonoid content decreased upon roasting and steaming. DPPH radical scavenging activity increased after roasting and steaming, but ABTS cation radical scavenging activity was found to reduce after all the treatments. Such discrepancy between DPPH• and ABTS•<sup>+</sup> inhibition can be attributed to the differences in the action of antioxidants. Fourier Transform Infrared (FTIR) spectra exhibited variations in the functional groups, mainly O-H and C=O bond stretching, upon processing leading to enhancement of hydrophilic, lipophilic and radical scavenging properties implying variations in the functional and antioxidative properties. Processing

## The Critical Realization of 21<sup>st</sup> Century – Mainstreaming of Millet Processing

Amandeep Kaur<sup>1</sup>\*, Barinderjeet Singh Toor<sup>1</sup>, Ankita Kataria<sup>1</sup> and Kawaljit Singh Sandhu<sup>1</sup>

<sup>1</sup>Department of Food Science and Technology, Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab-151001, India

\*Presenting author, [amandeepgamdoor@gmail.com](mailto:amandeepgamdoor@gmail.com)

### Abstract

In recent years, a gradual shift in the consumption pattern has been observed globally from traditional cereals to ancient grains especially millets attributed to their gluten free status, higher nutritional and antioxidant potential. Millets are considered as super grains because they are drought resistant and, exhibit rich nutritional profile containing 7-12% protein, 2-5% fat, 15-20% dietary fibre, substantial amount of vitamins, minerals and phytochemicals. Millets are nutritionally superior since they exhibit a balanced amino acid profile (lysine contents of kodo and finger millet – 2.2–5.5% of proteins) and mineral content (calcium content of finger millet – 294-390 mg/100g). One of the major disadvantage of millets is the higher concentration of antinutritional factors which include tannins (1-4 mg/100g), phytic acid (7-10 mg/g), oxalates (finger millet – 11.3 mg/100g; pearl millet – 20 mg/100g) and, trypsin and chymotrypsin inhibitors. Therefore, processing of millets is a very critical step in their effective utilization and in the development of palatable, nutritionally rich and functional food products. Millet processing can be categorized into two types – primary and secondary processing. Primary processing includes washing, cleaning, soaking, dehulling and milling which aid in removal of the undesirable seed coat and antinutrients, thereby enhancing the *in vitro* protein digestibility. For instance, tannin content and phytase activity in finger millet was reported to reduce by 22 and 29% respectively. Secondary processing, including thermal (flaking, popping, boiling, steaming, roasting, baking, extrusion) and bioactivation (germination and fermentation) techniques, converts primary processed raw materials into consumable food products. Thermal processing enhances the nutritional content, reduces antinutrients (mainly trypsin and chymotrypsin inhibitors), and increases the shelf life by inactivating the indigenous enzymes especially lipase. Additionally, non-enzymatic browning during thermal processing results in formation of Maillard reaction products, thereby enhancing the antioxidant profile. For instance, roasting of finger millet improved the total phenolic content (TPC), total flavonoid content and



Ref. No.: 1120/CO<sub>2</sub>/23

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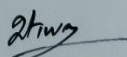


**Technical Presentation Award**

This is to certify that Mehak Gambhir....., ..... has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: Nano-Starches: An Advanced Approach of Nanotechnology in Food Industry.

  
General Secretary

2nd Position Poster Presentation   
Convener



scaffolds such as organoarsenes have been evaluated for their anticancer profiles. Among metallocenes, ferrocene is the most charming pharmacophore for drug design and discovery, which is a neutral, chemically stable and nontoxic moiety. In continuation with our interest, series of ferrocenyl chalcones - isatin triazole linked molecular conjugates were synthesized, characterized on the basis of spectroscopic and analytical evidences. The compounds thus formed were evaluated for their biological activity against a panel of cancer cell lines.

**Keywords:** Isatin, Ferrocene, triazole

#### **Effect of Flaxseed incorporation on the Rheological Properties of Wheat Flour Dough**

Meetal<sup>1</sup>, Navneet Kaur<sup>1\*</sup>, Ankita Kataria<sup>1</sup>, Barinderjeet Singh Toor<sup>1</sup> and Kawaljit Singh Sandhu<sup>1</sup>

Department of Food Science and Technology, Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab-151001, India

#### **Abstract**

Rheology is the science concerned with stress-strain and time relations of materials which show an intermediate behaviour of solids and liquid. Flaxseed is an oilseed that is high in omega-3 fatty acids, dietary fibre and lignan. Incorporating flaxseeds into wheat flour affects its quality and rheological behaviour of the dough which has been presented in this study after evaluation on the farinograph, extensograph and mixolab. The farinographic studies show that with the increase in the level of incorporation of flaxseed from 0 to 20%, water absorption and dough development time increase while dough stability decreases. The increase in water absorption by 5.97% can be attributed to the increased mucilage content (hydrocolloid) associated with flaxseed flour. However, if the particle size of the flaxseed flour is higher (implying lower surface area), the water absorption reduces by 3.87% which may be attributed to the gluten dilution which requires less hydration. The increase in dough development time by 40 – 247.06% could also result from the dilution of gluten and the difficulty of mixing fibre and wheat flour homogeneously. In certain cases, a shorter dough development time can be regarded where water absorption is also low consequently leading to lesser mixing time. Stability of the dough has been reported to reduce by 32% upon addition of flaxseed flour which may be attributed to the reduction of gluten forming proteins causing weakening of the dough. The addition of flaxseed flour can decrease the extensibility by 22.5%. The farinograph and extensograph evaluation showed that flaxseed flour had significant weakening effect on the dough rheological properties. Mixolab evaluation, which also simulates the thermal process involved in baking (for bread production from the dough), has revealed that addition of flaxseed flour increased the speed of protein weakening and reduced the starch gelatinization and retrogradation upon heating. Therefore, it can be inferred that, although incorporation of flaxseed flour reduces the dough rheological properties, it enhances the baking and shelf properties of the bread. Thus, flaxseed incorporation of 5 – 10% in the wheat flour can provide an optimal balance of rheological properties alongwith the required nutritional, health and technofunctional benefits of flaxseeds. Future exploration areas may include addition of gums to increase the level of flaxseed incorporation to prepare a dough with optimal rheological properties for utilisation in myriad baked and extruded products.

**Keywords:** rheology, flaxseed, farinograph, extensograph, mixolab, dough

#### **Enhancing Erosion Resistance of Turbine Steels: A Study on HVOF-Sprayed Coatings and Predictive Modeling**

<sup>a</sup>Mithlesh Sharma <sup>b</sup>Gagandeep Kaushal <sup>c</sup>Deepak Kumar Goyal

<sup>a</sup>GCET, Kahnpur Khui, Ropar, 140117, India

<sup>b</sup>YCOE, Punjabi University Guru Kashi Campus, Talwandi Sabo, 151302, India

<sup>c</sup>IK Gujral Punjab Technical University, Main Campus, Kapurthala, 144603, India

#### **Abstract**

The present research focused on applying high velocity oxy fuel (HVOF) sprayed coatings, namely Cr3C2-25NiCr and Cr2O3, onto 13Cr4Ni turbine steels. These coatings were then tested under accelerated slurry erosion conditions using a specially designed laboratory setup. The study varied slurry concentration, impact velocity, and impact angle using the Taguchi approach. Microstructural analysis of the coatings, erodent particles, and coating powder was conducted using a scanning electron microscope (SEM). The results showed that the HVOF-sprayed Cr3C2-25NiCr and Cr2O3 coatings significantly enhanced the erosion resistance of 13Cr4Ni turbine steels, attributed to their higher micro hardness compared to the steels. SEM images taken before and after the erosion tests revealed that the Cr3C2-25NiCr coating displayed mixed (ductile and brittle) behavior, while the Cr2O3 coating predominantly exhibited ductile behavior during slurry erosion. Furthermore, the study aimed to develop a predictive equation using regression analysis to estimate erosion wear rates under different conditions. The predicted results closely matched experimental values, indicating the accuracy of the developed equation in estimating erosion wear rates under varied conditions.

### Enhancement of Oral Bioavailability of Arteether with the Help of Natural Bioenhancer -Curcumin

Pratiksha Sharma, Mansi, Ashish Baldi\*

Pharma Innovation Lab, Department of Pharmaceutical Sciences and Technology, Maharaja  
Ranjit Singh Punjab Technical University, Bathinda-15001,

\*Corresponding author; Contact- +91-8968423848; Email: [baldishish@gmail.com](mailto:baldishish@gmail.com)

#### Abstract

Solid dispersion is one of the most widely and successfully applied technique to improve the solubility, dissolution rates, and consequently the bioavailability of poorly soluble drugs. It is based on the concept that the drug is dispersed in an inert water-soluble carrier at a solid state. In the current research work, solid dispersions of arteether were prepared by melting method using various hydrophilic polymers viz.  $\beta$ -cyclodextrin, poloxamer 407, polyethylene glycol 6000, and curcumin. The prepared solid dispersions were further characterized by particle size analysis, Fourier Transform Infrared Spectroscopy, Differential Scanning Calorimetry, X-ray Diffraction, and evaluated for enhancement in saturated solubility and in vitro dissolution profile. The pharmacokinetic investigations conducted on rabbits demonstrated that the formulated solid dispersion containing arteether (at a dose of 6 mg/kg) in conjunction with curcumin complex (at a dose of 20 mg/kg) exhibited significantly increased values for the area under the curve and maximum plasma concentration and hence bioavailability. The present findings may lead to the development of an efficacious oral dosage form to deliver arteether orally for the very first time.

Keywords: Arteether, Bioavailability, Curcumin, Dissolution, Solid Dispersion, Solubility enhancement.

### Design, Print and Consume: The Technology behind 3D Printed Chocolates

Amandeep Kaur<sup>1</sup>, Khushneer Kaur<sup>1\*</sup>, Ankita Kataria<sup>1</sup>, Barinderjeet Singh Toor<sup>1</sup> and Kawaljit Singh Sandhu<sup>1</sup>

Department of Food Science and Technology

Maharaja Ranjit Singh Punjab Technical University, Bathinda, Punjab-151001, India

Presenting author: [khushneerkaur1@gmail.com](mailto:khushneerkaur1@gmail.com)

#### Abstract

Chocolate is a globally consumed product with a global CAGR of 27.5% of 3D printing chocolate industry. 3D printing makes it possible to produce unique and complex food items with multiple advantages such as customized food designs, personalised nutrition and broadening of the available food material. In food industry, 3D printing has demonstrated its capability on making personalised chocolates, allowing precise control over amount of chocolate used and creation of complex structures that is difficult to achieve in conventional chocolate processing. Chocolate is ideal for extrusion printing, because of cocoa butter, its main component, which melts upon heating in the temperature range of 28 to 40°C and solidifies after cooling to form a self-supporting layer. By proper tempering, a more stable  $\beta$ -crystal (polymorph 5) can be obtained, which exhibits a melting point of 33.8°C and produces chocolate with superior characteristics such as glossy appearance, snap and desirable texture. It is paramount that the chocolate retains its structure during 3D printing, which depends upon the thermal properties such as glass transition temperature and melting point, consequently affecting the post deposition solidification of the deposited layer. Dark chocolate is composed of different ingredients such as cocoa mass, sugar, emulsifier and may contain milk powder which affect the flow behaviour of chocolate as they exhibit diverse thermal properties. Several factors such as fat content, surfactant/emulsifier and the particle size affect the rheological properties and quality characteristics of the 3D printed chocolate. The incorporation of additives has been observed to vary the melting point from 31.4 to 32.1°C along with rapid reduction in viscosity between 31.1 and 33.3°C providing versatility in 3D printing. Fat melting occurs upon increasing the temperature from 25 to 32°C causing rapid reduction in the viscosity of chocolate (with and without additives). Chocolate exhibits a shear thinning flow behaviour and can be modelled on Herschel-Bulkley equation with significant variations in the yield stress ( $\tau_0$ ), consistency coefficient (K) and flow behaviour index (n). The addition of particulate matter influenced the network system of chocolate which has been found to increase the  $\tau_0$ , reduce K & n, thereby affecting flow properties of 3D printed chocolate. As an emerging food processing technique, a large window exists in 3D printing with regards to the chocolate industry, which needs to be explored further for enhancing the commercialization of 3D printed chocolate products.

Keywords: 3D printing, chocolate, cocoa butter, Herschel-Bulkley, rheology, shear-thinning



**Prof (Dr) A K Saini**  
President

**The Institution of Electronics and  
Telecommunication Engineers (IETE)**

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draksaini@ipu.ac.in  
Website: www.iete.org

IETE/J-216/2024

22 Aug 2024

**IETE-BIMAN BEHARI SEN MEMORIAL AWARD-2024**

Dear Dr Munish Kumar,


I am happy to inform that you have been selected for "IETE-Biman Behari Sen Memorial Award" for the year 2024 for outstanding contribution in the Emerging areas of Electronics and Telecommunications with emphasis on R & D and industrial development.

2. I am pleased to extend my sincere congratulations to you on being honoured with the esteemed "IETE-Biman Behari Sen Memorial Award". The award is a testament to your exceptional research with unwavering commitment. The award comprising a medal, a citation, cash prize and travel grant would be presented to you at the 67<sup>th</sup> Annual IETE Convention of the Institution being held at IES University, Bhopal on 14<sup>th</sup> Sept 2024. More Details of the event will be communicated to you as soon as possible. You will be invited to deliver a lecture on the work leading to the award on a suitable occasion at an IETE centre nearest to your location.

3. On behalf of IETE Governing Council and on my own behalf, I congratulate you once again and wish you continued success in your endeavours.

With best regards,

Yours sincerely,

  
Prof (Dr) A K Saini

**Dr Munish Kumar**  
Associate Professor  
Department of Computational Sciences,  
Maharaja Ranjit Singh Punjab Technical University  
Badal-Dabwali Road  
Bathinda-151 001, Punjab

11/20/24, 3:34 PM

Gmail - Shiv Nath Rai Kohli Memorial Mid-Career Best Scientist Award-2023



Dr. Munish Jindal <munishcse@gmail.com>

---

## Shiv Nath Rai Kohli Memorial Mid-Career Best Scientist Award-2023

---

**neeraj.singh** <neeraj.singh@pu.ac.in>  
To: munishjindal@mrsptu.ac.in  
Cc: munishcse@gmail.com

Wed, Aug 21, 2024 at 3:11 PM

Dear Dr. Munish Kumar,

Greetings from Panjab University, Chandigarh

I am pleased to inform you that you have been selected for "Shiv Nath Rai Kohli Memorial Mid-Career Best Scientist Award-2023", comprising a cash of Rs. 50,000/- (Rupees Fifty Thousand) each, and a Plaque with citation, in recognition of your research contribution in the field of Computational Sciences.

The said award will be presented during the next PANJAB UNIVERSITY, CONVOCATION. The date, time and venue will be communicated to you accordingly.

Issued to:-

Dr. Munish Kumar,  
Associate Professor  
Department of Computational Sciences  
Maharaja Ranjit Singh, Punjab Technical University,  
Bhatinda.  
Punjab

With best wishes.

Dr. Neeraj Kumar Singh  
Deputy Librarian  
A C Joshi Library  
Panjab University, Chandigarh-160014  
Commonwealth Professional Fellow- UK 2017& 2012  
University of East London, London  
Phone No. 0172-253-4553  
Mobile:+91-9876575984



# Certificate of Appreciation

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Showcase of IPR or Commercially Viable Product in

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**Dr. Gulshan Bansal**  
Convener

**Dr. Suresh Kumar**  
Organizing Secretary

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## *Certificate of Merit*

Prof./Dr./Mr./Ms. Shubham Singh

presented a *oral paper/poster* entitled

Multidrug Combination Tablets for Paediatric Tuberculosis using 3-D  
and secured I position. Printing Technology.

DST-SERB & CST-UP Sponsored International Conference on

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Prof. (Dr.) Tarique Mahmood Ansari  
Convenor

Prof. (Dr.) Juber Akhtar  
Convenor

Prof. (Dr.) Syed Misbahul Hasan  
Convenor



Ref. No.: 1070/CO, 23

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**Technical Presentation Award**

This is to certify that Anisha Kumari....., has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: Effervescent and Confectionary Based Novel Formulations for Paediatrics: Development, Characterization

General Secretary

  
Convener



Ref. No.: 1055/60, 2023

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**Technical Presentation Award**

This is to certify that *Zaharat Muneer Mir*....., has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: *Development, Optimisation and Formulation of Nanostuctured Lipid Carriers of Mycophenolate Mofetil Using formulation by Design*

General Secretary

Convener





Ref. No.: 1086/CO,/23

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**Technical Presentation Award**

This is to certify that *Dikshant*....., ..... has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: *Formulation..and..Evaluation..of..Simvastatin...loaded...Hydrogel  
Sheet for wound healing.*

General Secretary

Convener



Ref. No.: 1066/CO1/23

## INTERNATIONAL CONFERENCE ON ADVANCEMENTS & FUTURISTIC TRENDS IN MECHANICAL & MATERIALS ENGINEERING

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### Technical Presentation Award

Poster presentation

This is to certify that Ms. Paul Shakur....., has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: Probiotic Nanomaterials: Unlocking the Potential of Nanotechnology.

General Secretary

  
Convener

## UNDERGRADUATE PRESENTATION SKILL CONTEST UPSC - 2023

Ref. No.: UPSC/23/11

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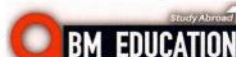
### Certificate of Participation

This is to certify that Arshdeep Singh.. student of Maharaja Ranjit Singh Punjab....  
Technical university....., has participated in the Preliminary/ Final Round of Presentations of 'Under  
Graduation Presentation Skill Contest (UPSC-2023)' on 22/10/2023. The candidate possesses ~~good/very~~  
good/excellent/extraordinary presentation and communication skills.

  
General Secretary

  
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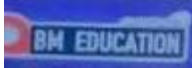
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**Technical Presentation Award**

This is to certify that *Shiv Kumar*....., ..... has presented a research paper during International Conference on "Advancement and Futuristic Trends in Mechanical and Materials Engineering (AFTMME-23)" on 26-28 October, 2023.

Title of Paper: *Comparative Analysis of Mango, Bamnyard Millet, and Maje Starches in Pharmaceutical Tablet Formulations : Physicochemical Characteristics and Drug Release Profiles*

General Secretary

Convener

3/26/24, 10:49 AM

Maharaja Ranjit Singh Punjab Technical University, Bathinda (Punjab) Mail - Fw: Saint-Gobain Transparence 18.0 | Congr...



MRSPTU  
Bathinda

Architecture Deptt <archdeptt@mrsptu.ac.in>

**Fw: Saint-Gobain Transparence 18.0 | Congratulations | Best Studio Project North**

1 message

architecture department G.Z.S.C.E.T., BATHINDA <arch\_deptt\_gzscet@yahoo.co.in>  
Reply-To: "architecture department G.Z.S.C.E.T., BATHINDA" <arch\_deptt\_gzscet@yahoo.co.in>  
To: Architecture Deptt <archdeptt@mrsptu.ac.in>

Sat, Mar 23, 2024 at 5:41 PM

Yahoo Mail: Search, organise, conquer

----- Forwarded message -----

**From:** "Aishwarjya, Das [ SGIPL - MKT ]" <Aishwarjya.Das@saint-gobain.com>  
**To:** "arch\_deptt\_gzscet@yahoo.co.in" <arch\_deptt\_gzscet@yahoo.co.in>  
**Cc:** "Ethos Empowers" <info@ethosempowers.com>, "Suhaan, Sherif [ SGIPL - MKT ]" <Suhaan.Sherif@saint-gobain.com>, "Shalini, Sah [ SGIPL - MKT ]" <Shalini.Sah@saint-gobain.com>  
**Sent:** Sat, 23 Mar 2024 at 5:27 pm  
**Subject:** Saint-Gobain Transparence 18.0 | Congratulations | Best Studio Project North

Dear Dr. Bhupinderpal Singh Dhot,

Greetings from Team Transparence!

We are elated to see the enthusiasm displayed by both the students and faculty members for Saint-Gobain Transparence 18.0 this year. We are writing this mail to extend our heartfelt congratulations to you and Charlina J dutta from the GZS School of Architecture and Planning, MRSPTU, Bathinda for receiving a Recognition for being the Best Studio Project at the North regional rounds in Architecture Category for India's Biggest student design competition; Saint-Gobain Transparence 18.0.

This year, we received around **680+** entries across the two categories from all over the country, out of which **75+** entries were from North region.

We had **Ar. Bhupinder Prabhakar (ARCOP), Ar. Shruti Dimri (Anagram Architects) & Ar. Mayank Mishra (SHiFt Studio)** on the jury panel.

We request the recognized best studio project students to send us the following at the earliest possible:

1. In order to accept the recognition, please fill and sign the attached form and send it back to us as a PDF in reply to this email by 26<sup>th</sup> March 2024.
2. A photograph/picture of yourself for social media broadcast.

Thank you for all the help and support on behalf of Team Transparence! We hope for a continued association with GZS School of Architecture and Planning, MRSPTU, Bathinda and look forward to active participation in the future as well.

Warm Regards,  
Aishwarjya Das  
Marketing Manager  
SAINT-GOBAIN

\* Congratulations to all faculty & staff for me

Saint-Gobain Transparence 18.0\_Student(s)\_Declaration Form.pdf  
511K



National  
Association of  
Students of  
Architecture



## CERTIFICATE OF SCHOLARSHIP

This certificate is awarded to **Priya** who has been awarded  
**BV Doshi Memorial Scholarship** Under Nasa India Scholarships Fund of  
**Rs. 50,000** of the National Association of Students of Architecture,  
India in its 66th year (2023-24).

HARI SASIKUMAR  
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NASA INDIA

SYED ABDUS SAMAD  
NATIONAL SECRETARY  
NASA INDIA

HARRSHWARDHAN BURRANDE  
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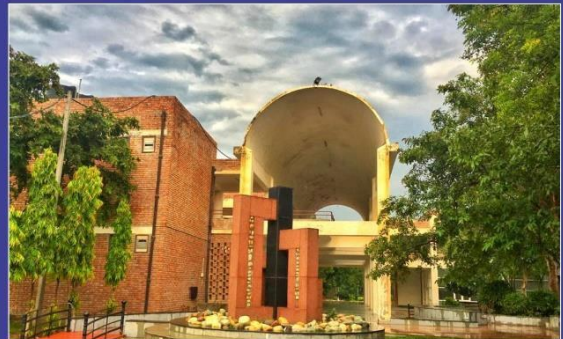


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