

## Proposed Research Program 2024-2025

<b>Grain Quality and Nutrition Division</b>				
Sl. No.	Program Area/Project/ Experiment Title & Duration	Major Objective	Expected output	
	1.1: Determination of physicochemical and cooking properties of advanced breeding lines	To help to develop data base on physicochemical, cooking and eating qualities of grain for newly developed breeding lines	Able to generate some breeding lines with superior grain quality.	500
	1.2: Evaluation of physicochemical properties of newly released BRRV varieties	To determine physicochemical and cooking qualities of BRRV developed rice varieties for updating the database	Able to generate a database for newly released BRRV varieties.	500
	1.3: Calibration of NIR to predict proximate composition of rice varieties	1.To calibrate a near accurate prediction model for proximate composition of rice 2.To characterizing the proximate composition (moisture, carbohydrate, protein, lipids, ash	Able to screening huge number of rice sample for proximate composition and gave an idea to the breeder for their quality in early stage.	200
	1.4: Analysis of cooking properties of different forms of rice cooked in Bangladesh	To determine the cooking properties of different form of rice (PB and UPB) with different treatments for better cooked rice	Able to gave a complete cooking idea with better cooked rice for the BRRV varieties.	250
	1.5: Identification of superior size and shape (length, ER, IR and 1000g wt.) of cooked rice on the basis of different cooking system	To identify the parameters of rice grain through comparison of different components of rice samples that are responsible for superior size and shape of cooked rice	This study will help to identify suitable cooking method which will give fine cooked rice length, elongation and volume expansion.	500
	1.6: Nutracevutical Characterization of newly released BRRV varieties	To determine nutracevutical properties including antioxidants, minerals, fatty acid and amino acid profiling's of BRRV released HYVs from BR1 to BRRV dhan100 and BRRV hybrid1 to BRRV hybrid dhan7 along with their	Able to generate a database for newly released BRRV varieties.	200

		physicochemical and cooking properties.		
	<b>Grain Quality parameters for Consumer Preference</b>			
	2.1: To Screening, Selection, and Training of Sensory Panelists	<ol style="list-style-type: none"> <li>1. To determine impairment of primary senses (colour, vision, ageusia and anosmia)</li> <li>2. To matching test for taste and odor substances</li> <li>3. To ability to detect basic taste and odor acuity</li> <li>4. To determine ability to characterized texture</li> <li>5. To performance in comparison with other candidates</li> </ol>	It will help to identify and measure the sensory attributes of interest and to relate quality indicators associated with the sensory attribute.	100
	2.2: Continuous Drying Solutions for Rice Bran Stabilization with Engineering Excellence	<ol style="list-style-type: none"> <li>1. Develop a novel mechanical dryer design that enhances the efficiency of the rice bran stabilization process, focusing on precise moisture control to improve overall product quality.</li> <li>2. Develop an efficient continuous drying system for rice bran stabilization, ensuring optimal moisture removal and improved product quality.</li> <li>3. Integrate innovative fabrication techniques and materials into the mechanical dryer construction, aiming to optimize overall performance, energy efficiency, and operational reliability.</li> <li>4. Design and fabricate an innovative mechanical husk-feed furnace for the dryer dedicated to rice bran stabilization</li> </ol>	<ol style="list-style-type: none"> <li>1. Develop and implement continuous drying methodologies specifically adapted for rice bran stabilization, emphasizing sustained and efficient heat treatment processes.</li> <li>2. Integrate advanced engineering principles and technologies to optimize the performance and reliability of the continuous drying solutions, ensuring consistent and high-quality outcomes.</li> <li>3. Emphasize excellence in engineering throughout the design, fabrication, and implementation phases to achieve superior results in rice bran stabilization, ultimately enhancing product quality and extending shelf life.</li> </ol>	350

		<p>5. Investigate and incorporate advanced technologies to achieve consistent and precise control over the drying process, aiming to extend the shelf life of rice bran while maintaining its nutritional value.</p> <p>6. Conduct comprehensive testing and validation processes to ensure the designed mechanical dryer significantly contributes to extending the shelf life of stabilized rice bran, while maintaining and possibly enhancing its nutritional attributes.</p>		
	<b>Nutritional Quality Assessment of Rice</b>			
	3.1: Anthocyanin content, their antioxidant properties and expression of anthocyanin biosynthetic pathway genes in pigmented Boro rice cultivars of Bangladesh	<p>1. To evaluate physicochemical properties and anthocyanin content in the pigmented traditional boro rice cultivars</p> <p>2. Analysis of expression of major genes (PAL, CHS, ANS) involved in anthocyanin biosynthetic pathway.</p>	This research helps to evaluate functional component from our traditional Boro rice cultivars which could be used as parental materials in rice breeding programs.	250
	3.2: A study on the high, intermediate and V. low amylose containing rice varieties and cultivars in relation to the palatability	To identify the parameters of rice grain through comparison of different components of rice samples that are responsible for palatability	This study will help to identify which one is responsible for superior cooked rice taste in Bangladeshi people among high, intermediate, low and V. low amylose containing rice varieties and cultivars.	200
	3.3: The effect of fermentation on the nutritional and microbial changes in panta bhat	<p>1. To evaluate the nutritional properties of panta bhat</p> <p>2. To determine the starch digestibility and bioavailability of mineral content</p>	This study will help for the comparison of nutritional properties between panta bhat and freshly prepared cooked rice.	100

		3. To evaluate the microbial properties and beneficial effect of panta bhat		
	3.4: A study on the different high protein containing rice varieties and cultivars in relation to the palatability	To identify the parameters of rice grain through comparison of different components of rice samples that are responsible for palatability	This study will help to identify high protein containing rice varieties and cultivars are responsible for superior cooked rice taste in Bangladeshi people.	200
	3.5: Assessment of heavy metals (Cd, Zn, Pb, Cr, As) in soil, water, and rice grain from industrial area (Dhaka, Gazipur, Narayangonj, Mymensingh, Narshindi etc.)	1. To quantify heavy metals in soil, water, and rice grain. 2. To identify area of rice field contaminated by industrial effluent water.	The study would reveal elevated levels of heavy metals (Cd, Zn, Pb, Cr, As) in soil, water, and rice grain samples collected from industrial areas around Dhaka, Gazipur, Narayangonj, Mymensingh, Narshindi, and others indicating potential environmental contamination and food safety concerns.	100
	3.6: Standardization of in vitro Glycemic Index (GI) method to evaluate GI value of rice	1. To standardize the in vitro GI method 2. To assess the variability of GI value through in vitro starch digestibility of physicochemically different BRRI varieties	This study will help to identify suitable method for easily evaluating the GI value of rice.	300
	3.7: Assessing and validating the BRRI Compact Rice Mill through a comprehensive exploration of physicochemical, mineral, and vitamin transformations across milling gradients	1. Assess the efficiency of the compact rice mill in terms of milling capacity and throughput. 2. Evaluate the impact of the compact rice mill on the physicochemical and cooking properties of milled rice, including quality parameters such as moisture content, milling yield, broken percentage, and head rice recovery. 3. Determine the impact of the compact rice mill on the mineral content of different varieties of milled rice, focusing on essential elements such as iron, zinc,	The findings will demonstrate significant physicochemical alterations, mineral changes, and vitamin transformations observed across different milling gradients using the BRRI Compact Rice Mill, providing valuable insights into the milling process and its impact on rice quality and nutritional attributes	150

		<p>and magnesium across varied degrees of milling</p> <p>4. Evaluate the influence of the compact rice mill on the vitamin content across milling gradients, with a particular emphasis on key vitamins such as B vitamins (e.g., B1, B2, B3) and vitamin E.</p> <p>5. Compare the mineral and vitamin content of different rice varieties processed by the compact rice mill with that of rice processed using standard milling methods, ensuring nutritional adequacy and quality</p>		
	<b>Commercial Rice Based Products</b>			
	4.1: Survey on rice-based value-added products available in the market (Recommendation from BARC workshop-2021)	<p>1. To find out BRR1 varieties are used commercially for producing rice-based products</p> <p>2. To analyze the nutritional quality of value-added rice-based products in the market</p>	Identification and analysis of emerging trends and consumer preferences in the rice product industry, providing valuable insights for businesses and policymakers to enhance product development and market strategies.	300
	4.2: Formulation of Value-Added Rice Based Noodles.	<p>1. To standardize a laboratory-scale method for making Flat, Macaroni, Spaghetti Pasta and Instant rice noodles,</p> <p>2. To study genotype variation in physicochemical cooking nutritional and sensory properties of rice flour in relation to noodles quality, and</p> <p>3. To identify specific characteristics responsible for producing superior quality of rice noodles.</p>	Rice based noodles will help people to increase their dietary diversity as well as those who are elergic to gluten can taste rice-based product insteas wheat.	500

4.3: Design and Development of an Advanced Machine for Rice Vermicelli (Chutki Semai) Production	<ol style="list-style-type: none"> <li>1.To design and implement a mechanical system for the efficient production of rice vermicelli, commonly referred to as 'Chutki Semai.'</li> <li>2. To create a standard formulation of rice vermicelli, known by the popular name 'Chutki Semai.'</li> <li>3. To adjust or modify the rice vermicelli manufacturing machine based on research discoveries as needed.</li> <li>4. To perform a proximate analysis of the nutritional composition of the produced rice vermicelli.</li> <li>5.To conduct a sensory evaluation to assess the overall quality and palatability of the rice vermicelli</li> </ol>	<p>Increase production capacity and efficiency of Chutki Semai (rice vermicelli) manufacturing.</p> <p>This output would highlight the machine's effectiveness in meeting the demands of large-scale production while maintaining product quality and consistency.</p>	100
4.4: Formulation of rice-based foods supplemented with anthocyanin-enriched fermented rice bran	<ol style="list-style-type: none"> <li>1. Physicochemical and biochemical characterization of pigmented anthocyanin rich rice varieties.</li> <li>2. Genome sequencing and analysis of gene expression in the anthocyanin biosynthesis pathway in selected Bangladeshi rice varieties.</li> <li>3. Formulation of anthocyanin-fortified rice-based bakery products with fermented rice bran</li> </ol>	<ol style="list-style-type: none"> <li>1. Whole genome sequencing (WGS) data of five selected rice will scale up the bioinformatic analysis in our capacity at BRRI.</li> <li>2. In vivo metagenomics study on gut microbioms will be concluded by consuming rice-based foods supplemented with anthocyanin-enriched fermented rice bran.</li> </ol>	GQN-KGF-OFANS Project Funded 2022-24 (3 years)
4.5: Baseline survey for quantitative dietary data collection on current weaning practices	<ol style="list-style-type: none"> <li>1. Collect information on current weaning practices of middle and low-income families of Bangladesh</li> <li>2. Dietary and nutritional data analysis to reveal nutrient intake of six months to two years old child</li> </ol>	Data on current weaning practices for six months to two years old child will be collected and that will help to formulate rice based weaning food.	800

		3. Appropriate formulation for weaning food for Bangladeshi children based on the survey data. GQN lab, RAL and DU		
	<b>Remote sensing in Precision agriculture</b>			
	5.1: Application of remote sensing in rice agriculture	<ol style="list-style-type: none"> <li>1. To monitor crops at different growth stages</li> <li>2. To ensure effective crop management</li> <li>3. To validate precision agriculture in rice cultivation</li> </ol>	Able to monitor crops at different growth stage to ensure effective crop management and validate precision agriculture in rice	800