PROJECT PROPOSAL

DEVELOPMENT OF RICE BASED BREAKFAST CEREAL FROM LOCALLY GROWN RICE WITH ENHANCED MICRONUTRIENT CONTENT

OKAFOR, E. N.
(Principal Investigator)
Food Product Development Division
Department of Food Technology
Federal Institute of Industrial Research, Oshodi (FIIRO), Lagos

October, 2025.

TASK FORCE

S/N	Name	Task
1	Dr. Mrs. Jumai Adamu-Tutuwa	Overall Coordinator
2	Dr. Mrs. O.B Oluwole	Coordinator
3	Dr. Mrs. Oladunmoye	Supervisor
4	Dr. Mrs. Okafor, E. N	Principal Investigator
5	Mrs. Deborah Ibekwe	Raw material processing
6	Mr. Samuel Owolabi	Procurement and processing
7	Mrs. Atanda Monsurat	Product development
8	Mrs. Chinagorom Chinedu	Product development
9	Mr. Muyiwa	Microbiologist
10	Miss. Uchechi Agbugbua	Record keeping
11	Mrs. Ekaete Osokolo	Chemical Analysis
12	Mrs. Precious Oluwaleye	Raw material Processing

INTRODUCTION

In response to the growing demand for nutritious and locally sourced breakfast options, we propose a project focused on the development of a rice-based breakfast cereal made from locally grown rice in Nigeria. Rice, a staple in many cultures, holds immense potential to provide a wholesome and culturally relevant breakfast solution. By harnessing the nutritional benefits of rice and utilizing locally sourced ingredients, this project aims to not only contribute to the diversification of the breakfast cereal market but also to support local farmers and promote sustainable food practices.

Micronutrient deficiencies are a major public health concern in Nigeria and sub-Saharan Africa, particularly among children 0–5 years and school-aged children. Iron deficiency (anemia) affects 40–60% of African children, impairing oxygen transport, immunity, and cognitive development. Zinc, vital for growth and immunity, contributes to over 450,000 child deaths annually.

Our vision therefore, is to create a high-quality, affordable, and nutritionally rich breakfast cereal that reflects the flavours and traditions of our region. With a focus on utilizing locally grown rice varieties, we aim to strengthen the connection between consumers and local agriculture, fostering a sense of community and sustainability.

Findings from this study revealed that fortifying rice-based cereal with date palm significantly enhanced its micronutrient profile, increasing iron content by 41–73% and zinc by 9–39%, thereby meeting up to **one-third of the Dietary Reference Intake (DRI)**. These promising results underscore the need for pilot-scale production and product commercialization. Moreover, developing a rice-based cereal aligns with Sustainable Development Goals (**SDGs) 2, 3 and 9** which focus on ending hunger, promoting good health and wellbeing, and fostering industry, innovation, and infrastructure by year 2030.

JUSTIFICATION

- Rice is already widely consumed and culturally accepted across all six geopolitical zones of Nigeria. Rice production output rose from 8.9 to 9.1 million metric tons between 2023 and 2024, creating opportunities for rice-based value-added products and fortification options.
- The country's existing infrastructure which includes: 15 rice farms, 8 - 10 processing plants, and 8 - 10 major markets, supports large-scale production and distribution, ensuring sustainability.
- This innovation prevents glut, enhances nutrients and micronutrient dense food product options, reduces post-harvest losses, drives poverty alleviation (since the raw materials are locally available) and economic growth through new market opportunities.
- Unlike imported fortified cereals that are often expensive and inaccessible to low-income families, this rice-based breakfast cereal is designed from locally sourced raw materials, making it affordable, while fortification with plant-based sources improves nutrient quality at minimal additional cost. Moreover, the production process is simple, adaptable to community-level processing, and supports job creation in small-scale industries, contributing to food security and sustainability.

Methods

A quantitative method approach was used for this study. The micronutrient composition of the rice-based breakfast cereal was fortified with nutrient-rich Date palm. Two locally grown Nigerian rice varieties, Farmers' White and Abakaliki, and Date palm fruits were sourced from local farmers at Ifo in Ogun state, Nigeria. The paddy rice and date palm were processed and milled in powder. The cereal formulation was based on FAO daily recommended intake (DRI) for school aged children. Proximate composition (moisture, protein, fat, fiber, ash and carbohydrate) was carried out using AOAC (Association of Official Analytical Chemists) methods. Micronutrient analysis (iron, calcium, magnesium, phosphorus, zinc) was carried out for the raw and final product using atomic absorption spectrophotometer. Data analysis was carried out using one-way Analysis of Variance (ANOVA) to compare the micronutrient of different rice varieties. Significance level was judged at $p<0.05$.

Conclusion:

This initiative contributes to the diversification of the food industry, providing consumers with a culturally relevant and innovative choice. Moreover, the project places a strong emphasis on sustainability, from locally sourcing ingredients to adopting eco-friendly packaging practices, demonstrating a commitment to responsible and environmentally conscious business operations.

References

AOAC, (2016). Official Methods of Analysis (20th Ed.). *Association of Official Analytical Chemists*, Washington, DC. USA.

Ayamdoo, J. A., Demuyakor, B., Dogbe, W., & Owusu, R. (2013). Parboiling of paddy rice, the science and perceptions of it as practiced in Northern Ghana.

Barrett, C. B. and Bevis, L. E. M. (2014). The Micronutrient Deficiencies Challenge in African Food Systems. In: The Fight Against Hunger and Malnutrition - The Role of Food, Agriculture, and Targeted Policies. Oxford University Press, 1 – 48.

Burgess, A. and Glasauer, P. (2004). Daily recommended intake for energy and nutrients. FAO publication. Family Nutrition Guide (Appendix 1 and 2).

Eze, M. O., & Ibe, S. N. (2005). Effect of processing on the nutritional and antinutritional properties of rice. *Journal of Agricultural and Food Chemistry*, 53(11), 4119–4124.

Juliano, B. O. (1993). Rice in human nutrition. *Food and Agriculture Organization of the United Nations*, Rome.

Kamai, N., Omoigui, L. O., Kamara, A. Y., Ekeleme, A. Y. (2020). Guide to rice production in Northern Nigeria. Feed the Future; The US Government's Global Hunger and Food security initiative. Published by International Institute of Tropical Agriculture, Ibadan, Nigeria, 27 pp.

Meza, S. L. R., Sinnecker, P., Schmiele, M., Massaretto, I. L., Chang, Y. K., & Marquez, U. M. L. (2019). Production of innovative gluten-free breakfast cereals based on red and black rice by extrusion processing technology. Journal of Food Science and Technology, 56, 4855-4866.

Taghinezhad, E., Khoshtaghaza, M. H., Minaei, S., & Latifi, A. (2015). Effect of soaking temperature and steaming time on the quality of parboiled Iranian paddy rice. International journal of Food Engineering, 11(4), 547-556.