

## **New Approaches to Address Malnutrition: The Development of Safe and Nutrient-Dense Ingredients in InnoFoodAfrica**

Malnutrition is a major health concern in many countries, particularly in Africa, where a large percentage of the population is affected by food and nutrition insecurity. To address this issue, the InnoFoodAfrica project was initiated to develop safe and nutrient-dense food ingredients among other activities. This project uses various technologies to produce value-added ingredients, such as flours and fat replacers, that are rich in vitamins and minerals and can help combat malnutrition.

1. **Development of Safe and Nutrient-Dense Ingredients:** The InnoFoodAfrica project focuses on developing flours and fat replacers using conventional and innovative drying methods, as well as low glycemic index flours and high protein flours through various methods of bioprocessing. Raw materials were sourced from South Africa, Ethiopia, and Uganda, and imported from Europe when not available locally. All raw materials were thoroughly checked for quality, including the measurement of their microbiological quality, levels of aflatoxin, and fumonisin.
2. **Development of Flours:** The aim of the study was to create value-added, nutritious, and shelf-stable flours from orange-fleshed sweet potatoes, amaranth leaves, and green bananas. Results showed that the fastest drying was achieved using a combination of microwave and infrared. The low viscosity of the dried orange-fleshed sweet potatoes suggests that they can be used in complementary foods or bakery applications. The results of the drying experiments of amaranth leaves and bananas were similar, with microwave drying having the fastest drying rate and reducing drying time.
3. **Fat Replacers:** Teff and maize starches were modified into lipid microspheres for use as fat replacers in low-fat mozzarella cheese and Greek-style yogurt. The modified starches showed lower viscosity and were less susceptible to alpha-amylase hydrolysis compared to control, suggesting that it can also act as a resistant starch.
4. **Low Glycemic index (GI) Flours:** Heat moisture treatment using infrared and microwave was used to produce low GI Bambara groundnut, sorghum, and banana flours. Results showed the successful production of lower GI flours, with improved functional and nutritional properties.
5. **High Protein Flours:** The study aimed to produce protein concentrates from Bambara groundnut and cowpea flours using dry-fractionation and wet milling, and protein isolates using alkaline extraction. As expected, the alkaline extracts had higher protein content and yield than the wet-milled and dry-fractionated ones. The protein isolates and concentrates showed maximum solubility at pH 7-8 and minimum solubility at pH 4. The protein concentrates had higher water absorption capacity compared to the isolates, but the isolates had higher oil absorption capacity and emulsion stability. The protein isolates were also found to be more surface active and had higher foaming capacity compared to concentrates.

**Conclusion:** The InnoFoodAfrica project is making great strides in the development of safe and nutrient-dense food ingredients, with a focus on flours and fat replacers. The results of the study show the potential of these ingredients to combat malnutrition, with improved functional and nutritional properties and faster drying times. Further analysis of the microbiological quality of food products and ingredients will be conducted before sensory evaluation. The development of these ingredients has the potential to contribute to food and nutrition security and improved health outcomes for communities affected.