

## DEVELOPMENT OF MALUNGGAY-BASED PRODUCTS FOR HEALTH AND NUTRITION PROGRAM

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### ABSTRACT

Undernutrition remains a serious problem in the Philippines, especially among grade school children. In its efforts to promote the value of *malunggay* (*Moringa oleifera L.*), the research endeavored on the development of snacks with *moringa* leaves as primary ingredient. The *malunggay* food products developed were: ice cream, biscuit stick, *otap*, cookies, and cupcakes. These food products were subjected to sensory evaluation in terms of appearance, texture, aroma, and taste. The products were found to be generally acceptable by home economics teachers and grade school children. Steps were undertaken to fully disseminate the technology developed through mass media platforms, government and non-government collaborations, skills demonstrations, a recipe book, seminars and workshops, and posters.

*Key words: food product development, malunggay food products, sensory evaluation*

### INTRODUCTION

Undernutrition remains a serious problem in the Philippines. Available data show that in the past decade, about 4 million (31.8%) of the preschool population were found to be underweight for their age (FAO, 2010).

Chronic undernutrition damages the health, physical growth and development of children that result in stunting in the first two years (UNICEF, 2016). The prevalence of stunting among Filipino children below five years old increased from 30.3% in 2013 to 33.4% in 2015 and in 2016, the Philippines ranked ninth among countries with the highest number of stunted children (Save the Children Philippines, 2016).

In its role as a research institution, the Mariano Marcos State University (MMSU) aims to seek innovations that would help address health and nutrition concerns of Filipinos. This is in keeping with both the “traditional” role of higher education institutions as well as their “new” roles as drivers of innovation and stakeholders in private and private partnerships (Chatterton & Goddard, 2000). In its efforts to innovate and promote the value of *Malunggay* (*Moringa oleifera L.*), MMSU embarked on the development of food products utilizing *moringa* leaves as primary ingredient. The end-goal was to come up with products that are affordable and highly nutritious to supplement the nutritional needs of Filipino children.

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*Malunggay* leaves are rich in minerals, vitamins and other essential phytochemicals (Gopalakrishnan & Deriya, 2016). The leaves have been found to be rich in minerals like calcium, copper, iron, magnesium, potassium, and zinc (Kasolo, Bimenya, Ojok, Ochieng, & Ogwal-Okeng, 2010), and loaded with vitamins such as beta-carotene of vitamin A, vitamin B such as folic acid, pyridoxine and nicotinic acid, and vitamins C, D and E (Mbikay, 2012).

**METHODOLOGY**

The study endeavored to produce food products from *malunggay* to supplement the dietary needs of children. Specifically, it aimed to: prepare snacks acceptable to consumers particularly grade school children; and, foster dissemination and promotion of the technology to the community.

The study was confined to the utilization of the *malunggay* leaves as primary ingredients in all the products developed.

The products developed were based on existing, commercially available food products popular among school children. To observe strict adherence to the established procedures for processing, the addition of ground or pureed *malunggay* leaves to the ingredients was the only modification made. Thus, subjecting the products to nutrient analysis was not necessary.

The evaluation of the food products was anchored on sensory science theory (Hashmi, 2007) which gives importance to the value of sensory science in evaluating the characteristics of physical matter. In this method, -food is uniformly prepared and presented to panelists who record their evaluations of the product on a sensory evaluation sheet that is decoded and analyzed through statistical procedures.

Sensory evaluation (Prell, 1976), to be objective, must be with considerable degree of reliability and validity. For food products, the sensory qualities are appearance, texture, aroma and taste. Appearance is sensed by the eye. Texture is the mechanical stimulation of the sense organs represented by the tongue, gums and the hard and soft palate. Aroma considers the fragrance or odor of a product as perceived by the nose. Taste is the perception of the stimulus through the taste buds which are primarily located at the tongue .

The general concept advocated in this study is diagrammatically illustrated in Figure 1.

Development of the food products was carried out in the Food Service Laboratory Unit of the MMSU College of Industrial Technology, Laoag City. *Malunggay* leaves were collected, thoroughly washed and air dried. With the use of a blender machine, the leaves were ground finely and kept in sealed bags under room temperature. This was done prior to the development of



Figure 1. The Research Paradigm

each of the product to ensure clean and safe materials. free of any contamination. Stocking of materials was not done to prevent development of molds and other undesirable microbes. For products requiring malunggay puree, the fresh leaves were processed right at the preparation process.

The standard procedures for the preparation of the products developed were carefully observed. The addition of ground *malunggay* leaves among the ingredients was an added procedure. At least one cup of ground leaves was added for every volume set in the standard procedure.

The developed food products were subjected to evaluation by home economics teachers in elementary and secondary schools who are specialists in food. Likewise, as they are the primary target consumers, grade school children were involved to ensure acceptability of the products.

## RESULTS AND DISCUSSION

The *malunggay* food products developed were: ice cream, biscuit stick, *otap*, cookies, and cupcakes.

The *malunggay* ice cream is a frozen mixture of cream, milk, sugar, and stabilizer with pureed fresh *malunggay* leaves as flavor.

The *malunggay* biscuit stick is a mixture of flour, milk, sugar, eggs, and *malunggay* powder formed into sticks and baked.

Meanwhile, the *malunggay otap* is an oval-shaped puff pastry that is flaky and brittle sprinkled with little sugar. It is made of flour, shortening, sugar, and *malunggay* powder.

Finally, the *malunggay* cookie is a mixture of flour, milk, leavener, eggs, and *malunggay* powder. The cookies are prepared in various attractive shapes then baked.

The products developed were subjected to evaluation of 25 home economics teachers who are food specialists. Likewise, 50 grade school children were also involved in the sensory evaluation to ensure acceptability of the products as they were the primary target consumers. In addition, the 25 home economics teachers incorporated in their teaching strategies the importance and relevance of malunggay and malunggay-based products in their class activities for the students to appreciate and be enticed to eat the products. Actual cooking and preparation activities were further introduced to the students which in turn let their parents to learn these malunggay-based products for sustained nutritional requirements of school kids and youth as expressed and demonstrated by the teachers after the research study.

Based on the sensory evaluation done, the food products developed were found to be generally acceptable in terms of appearance, texture, aroma, and taste; thus, the products were deemed worthy of promotion and adoption by the community. Steps were then undertaken to fully promote and disseminate the technology developed.

**Mass media platforms.** The *malunggay* ice cream and baked products were featured in "Pinoy Records", a show aired by GMA Television Network and hosted by Chris Tiu. "Shoptalk", aired over ANC (ABS-CBN News Channel) and hosted by Pia Hontiveros, carried a live interview with the researcher who discussed *malunggay* as a wonder vegetable and the developed *malunggay*-based snacks. These products were also featured during the launching of the *Malunggay Republic*, a movement initiated by dedicated men and women committed to help in nation building by addressing poverty, malnutrition, and unemployment in the country through the propagation of *malunggay*. The movement was launched on February 8, 2009 during the ABS-CBN DZMM Teleradyo program entitled "Sagot Ko 'Yan", and at the Manila Hotel on February 16, 2009.

**Government and non-government collaborations.** The processing of *malunggay*-based snacks was also promoted through the initiative of government agencies and non-government organizations. These include the Department of Agriculture (DA) through the Agrilink-Foodlink Convention, the Department of Science and Technology (DOST), the Department of Health (DOH) through the National Nutrition Council (NNC), the National Anti-Poverty Commission (NAPC), Secure Philippines, Inc., and *Malunggay* Republic Movement.

**Skills demonstrations.** Upon learning of MMSU CIT's *malunggay* technology, the Biotechnology Media and Advocacy Center of the DA invited two professors and their students to demonstrate the preparation of *malunggay* recipes to residents of Barangay Commonwealth in Quezon City. The campaign was dubbed "*Malunggay* in the City". DepEd Region III also invited the MMSU *Malunggay* Team for a demo-cooking in Pulungbulo, Angeles City in relation to the agency's in-school feeding program.

***Malunggay* recipe book.** A recipe book on *malunggay* food products was published and distributed by MMSU.

***Malunggay* seminars and workshops.** Indeed, *malunggay* has become a "superstar" and now "the darling of food nutritionists". Research and development activities have considerably broadened the horizons and prospects of *malunggay*, once regarded as an ordinary and lowly vegetable tree and fence plant.

Considering the *malunggay*-based recipes and products as nutritious food for elementary pupils, the DepEd-Health and Nutrition Center once again invited the researcher as consultant in the workshop on the development and standardization of *malunggay*-based recipes for in-school feeding, which was held at the Development Academy of Philippines in Tagaytay City.

Furthermore, the DepEd-National Nurses Association invited the same food technology professors to discuss *malunggay* by-products to school nurses in an event held at the Teacher's Camp in Baguio City.

Moreover, the *malunggay* food products were again featured in the 12<sup>th</sup> Annual Conference of the Philippine Association for Home Economics in State Colleges and Universities based at the University of the Philippines in Diliman, Quezon City.

***Malunggay* posters.** The poster on *malunggay*-based recipes by the MMSU CIT Food Technology Department was chosen as grand winner in the Dr. Edgar F. Padilla's Best Poster Competition during the Ilocos Consortium for Industry and Energy Research and Development's (ICIIRD) 2<sup>nd</sup> Industry and Energy Symposium held at the Don Mariano Marcos Memorial State University–Mid La Union Campus in the City of San Fernando, La Union.

## CONCLUSIONS

Indigenous resources as alternatives to food production could gain wider acceptance when processed in accordance with the preferences of the consuming public. The study endeavored to produce food products from *malunggay* leaves. It was successful in developing ice cream, biscuit stick, *otap*, cookies, and cupcake. The sensory evaluation by home economics teachers and grade school children found the food products developed to be generally acceptable in terms of appearance, texture, aroma, and taste. Proven to be worthy of promotion and adoption by the community, steps were undertaken to fully disseminate the technology developed through mass media platforms, government and non-government collaborations, skills demonstrations, a recipe book, seminars and workshops, and posters.

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