



USAID
FROM THE AMERICAN PEOPLE



**Science, Technology, Research and Innovation for Development
(STRIDE)**

PHASE I

Potential of Dehydrated Vegetable Production in Strengthening Sustainability of Smallholder Vegetable Supply Chains



PHASE II

Potential of PHASE II Dehydrated Vegetable Production in Strengthening Sustainability of Smallholder Vegetable Supply Chains

GRANTEE: Xavier University (XU)

PRINCIPAL INVESTIGATOR: Dr. Maria Rosario P. Mosqueda

INDUSTRY PARTNER: Monde Nissin Corporation, Santiago Miki Factory, RYS Farm Products Retailer and Bukidnon Farmer-Trader

GRANT PERIOD: May 1, 2015 to July 15, 2017

GRANT AMOUNT: Php 9,693,586 (approximately USD206,300)

Alternative vegetable products

Northern Mindanao is the leading producer of high value vegetables in Mindanao. Post-harvest losses and unpredictable market price fluctuations, nevertheless, remain perennial challenges threatening sustainability for smallholder vegetable producers. During peak production periods, for instance, farmers incur heavy post-harvest losses because of very low market prices. Thus, some opt to let their produce rot in the field and be dumped in rivers or in market garbage bins rather than transporting it back from the market and incurring additional cost.

To provide viable solutions that would ensure sustainability of vegetable supply chains benefitting smallholders, XU, with support from USAID STRIDE, initiated a project on vegetable dehydration. This project was envisioned to provide alternative options for fresh produce during peak production periods and market glut.

Milestones

Focusing primarily on four economically important crops (cabbage, carrot, squash, and tomato), Phase I of the project accomplished the following:

- Development and evaluation of a prototype heat pump drying system;
- Development and evaluation of dehydrated vegetable-supplemented food products; and
- Assessment of the market potential of dehydrated vegetables and their economic impact on other processed vegetable products.



Products made from dehydrated vegetables. The research team was able to produce 16 products from four leading crops in the country



Dr. Mosqueda (right) inspects carrots produced in a farm in Miarayon, Bukidnon as a potential source of 'rejects' for dehydration.

The project demonstrated the feasibility of developing a laboratory-scale heat pump drying system for vegetables using locally available resources. This prototype was used to produce dehydrated cabbage, carrot, squash, and tomato for the project. Physico-chemical characteristics of the dehydrated samples were also assessed.

The project demonstrated the feasibility of developing a laboratory-scale heat pump drying system for vegetables using locally available resources. This prototype was used to produce dehydrated cabbage, carrot, squash, and tomato for the project. Physico-chemical characteristics of the dehydrated samples were also assessed. The project also demonstrated the range of existing food products that can be enhanced through

incorporation of dehydrated vegetables. Converting fresh vegetables into powder could also provide food processors opportunities to develop new products and generate jobs.

A total of 16 products were enhanced by the project team and were evaluated by senior food technology students. Eight products were shortlisted: a) carrot and squash cookies; b) squash, carrot and tomato noodles; and c) cabbage, tomato soup and arroz caldo. These products were developed as alternative food sources for disaster relief operations and for supplemental feeding and school-based feeding programs. Government institutions engaged in these programs were the target potential users. Acceptability of these products was evaluated through sensory evaluation by representatives of potential institutional users and household consumers. Among potential institutional users, squash cookies, cabbage soup, carrot cookies, and carrot noodles are the top four most acceptable products. Among household consumers, carrot and squash cookies were the most acceptable products.

Preliminary GIS-aided vegetable supply and demand assessment in Northern Mindanao indicated that oversupply is still a potential problem, particularly during the peak production periods. Adoption of the technology developed by XU will make a significant impact on oversupply. Tapping existing markets in need of dehydrated vegetables used in instant noodle condiments and noodle production, such as at the noodle manufacturer in Pagadian City, Zamboanga del Sur, is another viable option to avoid spoilage and oversupply.

Moving forward

For sustainability purposes and to further enhance the gains of the project, XU secured funding for a Phase II that focuses on linking vegetable farmers to two industry users (Monde Nissin Corporation and Santiago Fresh Miki Factory). Specifically, Phase II aims to do the following:

- Scale up the Phase I prototype dehydrator into a 200kg pilot vegetable processing line, meeting good manufacturing practices and food safety standards;
- Produce commercial grade dehydrated vegetable products that meet the specifications of selected food manufacturers; and
- Develop and evaluate two model dehydrated vegetable supply chains, involving the smallholder farmers in Bukidnon and two food manufacturers.

Results from these investigations will be shared with vegetable industries, local government units in Bukidnon that produce highland vegetables, farming communities, government agencies, and other stakeholders in various formats such as websites and electronic articles, videos, and TV and radio programs. The establishment of a start-up enterprise will be explored towards the end of the project.