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Development Of Sweet Potato Food Processing Training Plan For The Indigenous People Of Albay

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Abstract:
This study presents the development of a training program aimed at enhancing food processing skills using sweet potatoes for the Indigenous People (IP) in Albay, Philippines. Recognizing sweet potatoes' significant nutritional and economic potential, this training plan seeks to empower indigenous communities by teaching them value-adding food processing techniques. The program emphasizes the local varieties of sweet potatoes, white, yellow-orange, and purple, and introduces traditional and modern processing methods, such as boiling, shredding, roasting, and candying, alongside unique recipes like flavored chips and purple sweet potato jam. Designed with community needs and sustainable practices in mind, the training promotes food security and economic resilience by equipping IPs with skills that foster local entrepreneurship. Outcomes from training plan indicate increased knowledge retention, improved product quality, and enhanced marketability of sweet potato-based products. This culturally adapted training plan supports IPs in diversifying their income sources while preserving their traditional agricultural practices, ultimately contributing to community well-being and sustainable economic.

Keywords:
training plan, indigenous people, sweet potato, food processing, small business

INTRODUCTION:

Food security and nutritional improvement are vital concerns for many Indigenous Peoples (IPs) [1], [2], particularly in regions where traditional agricultural practices prevail. In Albay, Philippines, sweet potato (Ipomoea batatas) is a major crop with significant potential for value-added food processing. As a nutrient-dense root vegetable, sweet potato is rich in vitamins, minerals, and dietary fiber, making it an important food source for IPs [3]. But because IPs lack the knowledge and expertise in food processing, sweet potatoes' full potential remains underutilized despite their nutritional advantages. It is commonly known that value-added food processing plays an important role in improving the nutritional and economic standing of communities, especially in rural and indigenous context. Because of its many uses and nutritional advantages, sweet potatoes (Ipomoea batatas) are a great choice for processing projects. As stated by Tsegaye, sweet potatoes are high in antioxidants and important vitamins, including vitamin A, which improves dietary diversity and health outcomes for communities that consume them [4]. To improve their livelihoods and advance food sovereignty, indigenous people must be empowered through skill development and information transfer. Food processing-focused training programs can give communities useful skills that enhance food value and preservation while also opening doors for economic growth [5]. Training in sweet potato processing, in particular, can result in the creation of a variety of goods, including chips, flour, and purees, which will boost the marketability and revenue of native producers. Educating IPs about the benefits of using locally grown agricultural products can be very effective techniques to assist IPs better their standard of living without necessarily changing their culture. It's a fascinating attempt to teach IP about food's nutritional value and how to prepare and treat delicious foods. Incorporating good manufacturing practices standards can yield safe and hygienic food, which can help IP trainees establish integrity, trust, and increased productivity when they begin to establish a small food business in the community.Previous studies have shown that community-based training programs are beneficial for enhancing economic opportunities and food processing abilities. Food processing can significantly affect the livelihoods of indigenous people and smallholder farmers. A study by Kansou, K., et. al., highlighted that participatory training programs adapted to local communities can significantly improve knowledge retention and practical application. Such training programs encourage community engagement and collaboration, which are essential for sustaining development initiatives in indigenous contexts [6]. The study of Berhanu, Ayele, and Dagnew, on food processing training programs greatly increased participants' incomes by enabling them to create marketable goods like flour and sweet potato chips. By diversifying sources of income, this empowerment not only improves food security in households but also promotes community resilience [7]. Promoting sustainable development has been particularly effective when community-

based training programs with an emphasis on participatory techniques are used. Involving community members in the planning and execution of training programs increases engagement and improves information retention, according to Bitana, Lachore, and Utallo [8]. These kinds of programs promote local ownership, which is essential to the long-term viability of food processing projects. A culturally sensitive approach that integrates local customs and preferences into the training curriculum can greatly increase the program's relevance and efficacy in the context of Albay's indigenous people [9]. Additionally, studies have shown how crucial food processing is as a means of reducing poverty. Pawlak, and Kołodziejczak, emphasized that value addition through processing can turn raw agricultural products into higher-value goods, which can boost smallholder farmers' profitability [10]. Pernia, Tan and Dela Cruz conducted a study on the empowerment of indigenous communities through food processing training. Participants' self-efficacy and entrepreneurial skills were greatly increased by participatory training programs, leading to improved income-generating activities. The study highlights the role of culturally relevant training in fostering community engagement and sustainability [11]. Duffy, C., et. al, looked into the effectiveness of community-based training programs in food processing among smallholder farmers. Their findings revealed that training in food processing not only increased knowledge about food preservation techniques but also led to greater food security and improved nutritional outcomes. The study underscored the necessity to modify training programs to meet the specific needs of local communities [12]. Woodhill, Kishore, Njuki, Jones, and Hasnain explored the relationship between food processing training and nutritional outcomes. The researchers found that communities that participated in food processing training showed significant improvements in dietary diversity and nutritional status. This research supports the notion that food processing training can directly affect the health and well-being of communities, particularly those relying on staple crops like sweet potato [13]. Tedesco, D., et. al., studied the sweet potato value chain and identified training as a key factor in enhancing market access for smallholder farmers. The research indicated that training programs focusing on processing techniques significantly increased the competitiveness of sweet potato products, resulting in better market prices and improved farmers' livelihoods [14]. The indigenous people of Albay can use local resources to manufacture new goods that satisfy local and regional market demands. By creating a training program that focuses on sweet potato processing, this training plan aims to empower the indigenous people of Albay to improve their economic status while promoting food security and nutrition.Following corn, rice, wheat, potato, barley, and cassava in terms of global production, sweet potatoes come in fifth in developing countries [15], [16]. Sweet potatoes have higher protein and carbohydrate contents as well as specific vitamin and mineral contents when compared to other root and tuber crops [17], and having more provitamin A, vitamin C, and minerals than rice or wheat [18]. The beneficial health effects of sweet potato are based on its color [19]. Varieties with lighter flesh are said to have more phenolic compounds, while those with a deeper yellow color are said to contain more carotenoids, primarily ß-carotene [20]. Purple sweet potatoes have very high levels of anthocyanins, whereas yellow and orange-fleshed sweet potatoes are rich in phenolic acids [21]-[23]. This is a native plant that many of the IPs of Albay raise in their backyard gardens and regard sweet potatoes as their basic food. Despite the sweet potato's recognized potential and the importance of food processing training, there remains a gap in structured training plans that specifically cater to the indigenous people of Albay. This study aims to develop a comprehensive food processing training plan that incorporates local knowledge and practices while introducing modern techniques to enhance the production and marketability of sweet potato products. By addressing the specific needs of the indigenous communities, this training plan seeks to empower individuals, improve nutritional outcomes, and promote sustainable economic development in the region.

METHODS

Through consultation and coordinated meetings with the National Commission of Indigenous People (NCIP), Region V, Iriga City, the researchers of this study adhere to the guidelines and procedures for doing ethical, respectful, and significant research that serves Indigenous communities [24]. With a focus on community-based participatory research, indigenous methodology, and ethical considerations for Albay IPs, this study employed descriptive research methods using key informant interviews, focus groups, and survey questionnaires.The researchers' efforts to collaborate with the IPs in selected Albay municipalities, Malabnig, Guinobatan, Danao, Polangui, and Joroan, Tiwi, Albay were supported and accommodated by the NCIP office officers. A coordinated effort was made to preserve procedures, cooperation, and appropriate coordination with barangay officials, NCIP administrators, and staff in order to carry out the study. The data collected from the IPs' answers was interpreted using percentage tool. A training plan and modalities were developed, as an outcome demonstrating the uses of the modality of implementations on creating the food processing training plan for the IPs of Albay using sweet potato food products.

RESULTS AND DISCUSSION

This study developed a food processing training plan using sweet potato (kamote) for the Indigenous People in Albay. The training plan has been designed and validated by experts. The output of the study has and initial implementation through a seminar and actual training on enhancing food processing skills of the IP last June 28-29, 2022 at Bicol University Polangui Dormstel, Polangui, Albay. Only selected number was advised to participate on the said training, since it was still pandemic during that time. The training plan is developed by going through the following steps.

3.1. Profile of Indigenous People of Albay

The NCIP located "aetas" or IPs in several places in Albay, including the towns of Guinobatan, Polangui, and Tiwi. These people were residents of Barangay Malabnig in Guinobatan, with 63 households and 208 population; Danao, Polangui, Albay, had 230 households and 852 population; and Joroan, Tiwi, Albay, had 279 households and 1,067 population. Regardless of age or gender, there were 2,127 total population and 572 households. Since COVID 19 was at its peak when the research was implemented, the survey was done in Danao, Polangui, Albay, where the greatest number of IPs were available for interview. Danao is a remote barangay of the Municipality of Polangui [25] about 19.5 kilometers from the town proper. There were 31 respondents, 20 of whom were women and 11 of whom were men. To make it easier for the respondents to understand and complete each question, the questionnaire was translated into their mother tongue language. For those responders who have difficulty in understanding, they are assisted in reading in order to obtain answers to the questions presented.The age of the respondents were ranges from 18-55 years old. There were 29.08% or 9 are in the age category of 18-25 years old, there are 35.48% or 11 are at the age of 26-35 years of age, 19.35% or 6 are at their 36-45 years old and the least was 16.12% or 5 at their age 46-55 and above. The age bracket showed that the younger generation was noted of capability to obtain education and learning new things. The people of barangay Danao claim that IPs are no longer as native as before. IPs are learning and adapting modern trends of society they once lived in. As can be observed from the responses, 28% of respondents are undergraduates in elementary school, 41.93% are graduates of elementary school, 15.17% are undergraduates in high school, and 12.90% have never attended school, which is representative of older indigenous people. The IPs relied heavily on farming as their source of income. In addition to fishing in Danao Lake, the residents cultivate the ground to plant abaca, rice, corn, sweet potatoes, and copra. Together with the young people who greatly assist their parents, women works on the farm. It was found that 22.58, or 7 of the respondents, produce copra, 19.35%, or 6 of them, produce rice and corn, 16.12%, or 5 of them, produce abaca, and 16.12%, or 5 of them, produce sweet potatoes, 12.90%, or 4 of the respondents, produce vegetables, and 4 or 12.90% engage in fishing.

3.2. The Variety of Sweet Potato in the Locality

Sweet potatoes have the ability to address the urgent demands of food security and poverty alleviation, they have carved a niche for themselves in the worldwide market [26]-[29]. In addition to being a healthy substitute food and a rich source of carbs and phenolic compounds, it is being promoted as part of the plan to treat vitamin A deficiency in children and pregnant women [30]-[32]. Likewise, it is regarded as a vital staple food foundation for disaster preparedness and boosts household resilience against the negative effects of climate change [33], [34].

Figure 1. Sweet Potato (kamote) Variety, white, yellow orange, purple

The different varieties of sweet potato (kamote) available in the locality, as shown in Figure 1, were white as tres colores, orange as tinapayas or binuras, and purple as inaswang or inube. These varieties are often planted in good garden soil to have a good yield of roots rhizomes. The characteristics and colors of the sweet potato are classified according to its kind. IPs usually used sweet potato for dinner in place of rice and used traditional approaches like chopping and shredding of sweet potato (kamote).

The white variety [35] is said to be the "tres colores." It is the most popular type in the place because of its dense, sweet and high yield produce that sometimes the outer cover is red and sometimes it is white. This variety is smooth when boiled and becomes colorful and very attractive to eat. It is also good for kalingking, tapi-tapi, tubog-tubog, camote cue and sweets like molido candy. In general, the white variety is the best for making flour that are used for breads, puddings, cookies and other baked products. The orange variety of sweet potato is rich in Vitamin C because to its yellow and orange color. It is said that when a vegetable contains deeper green color the stronger the carotene vitamins it has. Carotene is good for the improvement of vision [36]. Orange variety of sweet potato is locally known as "tinapayas" or "binuras." The yellow and orange variety indicates the more intense the color the more antioxidant it has. Sweet potato is known for anti-oxidants that maintains good blood circulation and helps regular bowel movement too [37]. The orange type has a red and white covering and tastes sweeter than white while having the same nutritional content. It's extremely smooth texture gives it a somewhat different scent from white and commonly steamed. Because it has a bright, translucent yellow-orange tint when fried, this type breaks readily when cooked yet works well for making chips.Purple variety sweet potato is the rarest of the three kinds of sweet potato that are grown in the locality. This type is sensitive and has low yield. But what entices farmers to grow this type is the attractive color, ranging from light purple to deep purple. This type called as special sweet potato because of its royal color. Purple variety is locally known as "inube" or "inaswang." The nutritive contents are similar with other variety but the purple sweet potato is known for its antioxidant properties because of flavonoids content that are present in deep purple color [38]. This variety is used in "ginataan," sweet potato pudding, ice cream and an alternative to real ube. The light sweet or bland taste of purple sweet potato is a source of rich fiber that is regarded as food for diabetics and for people conscious in healthy diet.

3.3. Training Plan Development

The development of a training plan for sweet potato food processing aimed at the indigenous people of Albay involves a structured approach that incorporates community needs, local knowledge, and practical skills. The training plan is designed to empower participants, enhance their livelihoods, and promote sustainable practices through the effective use of locally available sweet potato varieties. The conducted training was carried out at the Polangui Campus Dormstel of Bicol University in Polangui, Albay, last June 27 and 28, 2022. The sweet potatoes (kamote) food processing training plan is shown in Table 1.The training plan for sweet potato food processing aims to empower the indigenous people of Albay by providing them with valuable skills and knowledge. By focusing on hands-on learning, local varieties, and sustainable practices, the program seeks to enhance food security, improve economic opportunities, and promote the cultural significance of sweet potatoes in the community.

3.4. Different Techniques Used for Sweet Potato Food Processing

The IPs used the traditional food processing techniques for sweet potatoes (kamote). Due to their sweeter flavor, the white and orange varieties are typically boiled, while the purple variety is typically prepared for guinataan, to which additional ingredients are frequently added to create a visually appealing display of color. With this context, researchers introduced a food processing techniques in making sweet potato food product for IPs. Boiling or Steaming. This processed is common among the IPs and other household in the community. This process involves the washing of the sweet potato (kamote) to remove the adhered soil in the crop. This is to make a clean skin of the crop before cooking. The product is plainly sweet potato in taste. This is used as breakfast, merienda or even a lunch or dinner if rice is not available. The researchers discuss to IPs that the boiled sweet potato (kamote) goes well with shred semi-young coconut or cooked hot spicy vegetable.Shredding. Local households call it "iraid". The researchers introduced to IPs the use of multifunctional shredder or slicer that can be found in the market rather than using an improvised shredder such as used can from sardines and punching it using a nail to make a sharp shredder hole. The shredded sweet potato (kamote) is used to cooked "balinsuso, tubog tubog, tapi-taapi, bibingka or puto." Cutting and slicing into thin chips. The researchers offer this method for slicing the sweet potato (kamote) crop thinly to produce fried chips. To get a crispy texture, the prepared cut is deep-fried in oil. It is then lightly salted to enhance its flavor and increase its edibility. In order to make "kalingking," sweet potatoes (kamote) are chopped into strips and then fried with rice flour to get the appropriate thickness and sizes. To create a beautiful fried sweet potato product, banana or cocoa leaves are used as a pre-molder.Roasting. The researchers present this method by utilizing a different method of roasting. After the rice and vegetables are cooked, the pot is dented, the sweet potato (kamote) is placed inside the burned charcoal or fuel, and it is covered again with the hot, burned mixture of ash and fuel, which cooks the sweet potato slowly. This procedure produces very tasty and nicely cooked yields.

Table 1. Sweet Potato (kamote) Food Processing Training Plan

Objectives	Topic	Activity	Outcomes
DAY 1			
Explain the objectives and mechanics of the training	Initializing training in food processing in the IPs of Albay; Introduction to developing food processing skills using sweet potato (kamote); Identify the different cooking terms	Purpose and mechanics of the training; Lecture on variety of sweet potato (kamote)	Ability to ask questions on the proceedings of the training; Ability to appreciate and value learning in food processing; Capability to identify the uses of the ingredients
Transfer skills to choose different processing implements	Cooking tools and materials	Identification of cooking materials and discussion of processing and cooking terms; Distribution of learning materials on processing sweet potato	Ability to choose correct implements used in cooking; Reading and understanding of the learning materials
Apply clean manufacturing processes	5s in a workplace	Perform 5s in the workplace area	Ability to apply sanitation and hygiene in processing of foods
Perform cookery processes for sweet potato (kamote)	Boiling or steaming sweet potato; Shredding sweet potato; Cutting and slicing into thin chips; Roasting; Candying	Demonstration and return demonstration on making sweet potato food products	Ability to work in a team; Ability to follow the step-by-step procedures; Ability to apply good manufacturing process for safer food product
Identify packaging materials for food and draw idea for labeling and packaging	Packaging and labeling	Practice packaging of food products and perform product costing and pricing; Conduct inspection on packaging materials presented	Ability to demonstrate and perform sample sealing and labeling of food products
Compute cost of production	Pricing and costing of products; Making of own label	Application of costing and pricing per product; Presenting sample design for personalized label	Ability to record the price of raw materials; Ability to compute for the price
DAY 2			
Perform other cookery processes for sweet potato (kamote)	Flavored sweet potato chips; Purple sweet potato jam; Sweet potato empanadas; Sweet potato buchipan	Demonstration and return demonstration on making other sweet potato food products	Ability to actuate with confidence to do the following recipes with correct procedures in frying of products

Package the product	Review of packaging and labeling; presentation of products	Showcase a product according to quality standards; Food selection of most preferred product	Check the product according to standards; Ability to showcase selected food product; Capability to value the use of colored variety of sweet potato for entrepreneurial activity
Evaluate the training activity	Recapitulation of the training activity; Carry-out training experiences after the training	Evaluation and feedback to the activity	Ability to provide evaluation and feedback to the activity; Ability to appreciate and value the aim of the training; Ability to continue growing of purple sweet potato variety for sustainable production

Candying. Boiled white sweet potatoes (kamote) are used in this procedure. The researchers' shows to IPs the proper use of white sugar combined with the finely mashed sweet potato in a one-to-one ratio. Cook over low heat, stirring frequently to keep the sugar and boiled sweet potato from burning. The candy is sugary and clearly tastes of sweet potatoes (kamote). This is a square-shaped hard candy that is served as dessert and best made for special occasions.
Flavored Sweet Potato (kamote) Chips A colorful and entertaining twist on potato chips are thinly sliced sweet potatoes that are deep-fried till crunchy. Their flavor is rather orange and slightly sweet, and a dash of salt brings it all together. The sweet potatoes (kamote) should be sliced as uniformly as possible before making these chips. Second, the oil's temperature needs to be hot but not excessively hot. A sharp knife, keen eye, and steady hand will do the task.Purple Sweet Potato (kamote) Jam. This jam, which is made from naturally sweet purple sweet potatoes, is nutrient- and flavor-rich. Purple sweet potato (kamote) jam can be used as a topping for your preferred dessert, spread over toast, or mixed with yogurt. It is a tasty and adaptable addition to any dish.Sweet Potato (kamote) Empanada. They are comparable to the portable pies that are popular in other cuisines, consisting of pastry dough filled with a variety of sweet or savory ingredients. These flavorful empanadas have cheese, bacon, caramelized onions, and spiced sweet potatoes within. Sweet Potato (kamote) Buchipan. A finger snack perfect for merienda, deep-fried sesame-covered buchis with sweet potatoes (kamote). Chinese rice cake buchi, is created locally using sweet rice flour and sweet bean paste coated in sesame seeds. This rice ball has emerged as a symbol of the Chinese-Filipino culinary heritage and can even be found on the menus of various fast-food and local eateries. Incorporating these food processing techniques into the training plan for sweet potato processing is essential for empowering the indigenous people of Albay. By equipping participants with the knowledge and skills to utilize these methods, they can create a variety of nutritious and marketable products that enhance their livelihoods and promote food security. Each technique can be tailored to the community's needs and preferences, fostering cultural relevance and sustainability in the training program.

CONCLUSION:

There are 572 households belonging to the Indigenous People, of which 63 are in Malabnig, Guinobatan; 230 are in Danao, Polangui; and 279 are in Joroan, Tiwi, Albay. The training plan was developed and the distribution modalities were carried out at the Polangui Campus Dormstel of Bicol University in Polangui, Albay. The sweet potato varieties available in the IPs were the white variety called "binuras," the yellow orange variety called "tinapayas," and the purple variety as "inaswang or inube." IPs were shown various methods for enhancing the food processing of sweet potatoes, including boiling and steaming, slicing, roasting, and canning, flavored sweet potato chips, purple sweet potato jam, sweet potato empanadas, and sweet potato buchipan.Sweet potato is a staple crop with significant nutritional value and cultural importance among the indigenous people of Albay. Tailoring the training plan to incorporate local practices and preferences is crucial for fostering community engagement and acceptance. Implementing food processing techniques can significantly increase the value of sweet potatoes, allowing IPs to diversify their income sources. By producing various sweet potato products, IPs can meet local and regional market demands. The training plan empowers IPs by equipping them with practical skills and knowledge related to food processing. This empowerment can lead to improved self-efficacy, entrepreneurship, and economic independence. Emphasizing the nutritional benefits of sweet potatoes in the training can lead to better dietary practices within the community. Processed sweet potato products can contribute to improved health outcomes. The training plan's sustainability hinges on establishing community support networks and partnerships with

local organizations and government units. Ongoing mentorship and collaboration can enhance the long-term impact of the training.

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