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BANANA PROCESSING INNOVATION OF THE COMMUNITY ENTERPRISE CENTER, BANANA CONSERVATION CENTER SUPHANBURI PROVINCE

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Abstract

Thai people's way of life has good beliefs and cultures that are in harmony with nature and plants. The process of upgrading banana processing products of community enterprises through innovative processes to product standards, Suphanburi Province Banana flour production sources can be upgraded to be registered as Good Agricultural Practice (GAP). Both locations have the potential to manage planting areas well. Another location has market potential. Therefore, it was upgraded to a buying and selling center, by making an agreement with the production source and the packaging source that has been notified both GAP, HACCP, CODEX GMP, and FDA. At present, the Suphanburi Banana Conservation Center has received permission to register patents and trademarks for the fiber-enriched banana powder drink formula and production process. The production enterprise group earns income from selling banana powder at a price of 500 baht per kilogram. In one month, 50 kilograms must be sent to the Banana

Conservation Center per month for packaging and distribution online to conservation consumers, health, and as a result, the grassroots economy is progressively better.

Keywords: Banana processing innovation; Community Enterprise Center; Banana Conservation Center

Introduction

Bananas are fruit that contains complete nutrients and can be consumed both ripe and unripe, offering different benefits. In terms of medicinal uses, bananas are particularly beneficial for the digestive system, whether it's diarrhea, constipation, or stomach ulcers. Additionally, banana stems and flowers are rich in fiber, acting as a natural fiber to help eliminate waste residues in the intestines. Banana cultivation does not require much space, is easy to grow, and helps improve poor soil conditions. It also reduces pollution by using parts of the banana plant, such as banana leaves, banana trunks, and stems, as substitutes for foam and plastic. If we learn to use parts of the banana plant beneficially, it will help balance the environment.

In the future, apart from processing bananas into dried bananas and banana chips, technology, and scientific processes can be used to produce banana flour products, which can replace imported wheat flour or non-dairy creamers as an alternative for health-conscious groups. This research will use the Nāmwā and Mali Nong banana varieties, which are the most commonly grown by farmers, for study. Bananas are a fruit that contains complete nutrients and can be consumed both ripe and unripe, offering different benefits as follows:

Unripe Bananas: Mainly composed of starch, they help lower blood sugar levels and are suitable for those who want to control their weight or have diabetes. They also have high dietary fiber, aiding in digestion and preventing constipation.

Ripe Bananas: Contain more natural sugars, provide energy to the body, and are suitable for consumption before or after exercise. They also contain antioxidants that help boost the immune system and slow down cell aging. Thus, consuming bananas in both forms offers diverse benefits suitable for different bodily needs in various situations.

Figure 1,2,3: Photo by Phrakrusophonweranuwat, Director of community enterprises through innovative processes to product standards, Suphanburi Province

Payao Muanwongyat (Banana Information, www.thaikasetsart.com/ October 28, 2023) stated that bananas are large perennial herbs in tropical regions, originating in Southeast Asia. They belong to the Musaceae family, and their scientific name is Musa sapientum Linn. Other names include Kluai Khai, Southern Banana, Kluai Som, Kluai Hom (Northern), Kluai Nāmwā (Central), and Laek (Chong-Chanthaburi). The English name is Banana.

Tem Smittinand mentioned (Names of Plants in Thailand, 2001) that Kluai Nāmwā is a perennial herb. The underground stem is succulent, about 2-5 meters tall. The leaves are single, arranged spirally, and densely packed on the stem. They are large, oblong, approximately 40x200 cm, with rounded tips and bases. The leaf edges are smooth, and the leaf surface is smooth. The upper side is dark green, and the underside is lighter, with a white powdery substance adhering to it. The petiole is divided into two parts: the first part attaches to the stem, and is flat, curved, succulent, and green with a reddish-brown tinge (this part appears like the

stem). The second part is round, with a deep groove running along the center, light green, and tapering to the leaf tip. The flowers bloom in clusters at the top, with large bracts at the base of each flower cluster. The bracts are thick and dark red. When the ovaries develop into fruits, the bracts fall off. The fruits are cylindrical, about 5 cm in diameter and 10 cm long. The seeds are round, black, and wavy, about 0.50 cm in diameter.

Narin Charoenphan (2014) mentioned that bananas are rich in nutrients and widely cultivated in Thailand. Currently, banana flour is popular, particularly from varieties such as Kluai Nāmwā, Kluai Khai, and Kluai Hom Thong. It has been found that banana flour can be used in various foods, such as baked goods and beverages. Additionally, extracted dietary fibers and resistant starch from unripe Kluai Khai peel and flesh have shown preliminary prebiotic properties suitable for probiotic bacteria, making them potential ingredients for future food applications (Suchart Suksathit and Pusadee Tungwatcharin, 2015, pp. 49-60).

Good Agricultural Practices (GAP)

Definition: Good Agricultural Practices (GAP) for food crops refer to the standards for agricultural practices aimed at producing crops that are of high quality, meet standards, and are safe for both producers and consumers. It involves controlling the entire production process from land preparation, seed selection, planting, maintenance, harvesting, transportation, and post-harvest handling. Farmers are required to record every step of their operations to ensure the production process is of high quality and can be verified.

Levels of GAP Requirements for Food Crops (Thai Agricultural Standard - TAS):

1. Major Requirements: Must be followed; non-compliance has a direct or severe impact on food crops, making the produce unsafe.

2. Minor Requirements: This should be followed; non-compliance increases the risk of unsafe produce.

3. Recommendations: Suggested practices that enhance safety and quality.

4. GAP Standards for Food Crops: Specific standards that outline good agricultural practices for food crops.

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Benefits for Farmers:

1. Knowledge and Capability: Enables farmers to systematically produce crops, reducing costs and increasing yields.

2. Quality Produce: Ensures that produce is of high quality, meets standards, is safe, and is in demand both domestically and internationally.

3. Reduced Chemical Use: Minimizes chemical use, thereby preventing environmental pollution.

4. Certification and Market Acceptance: Production and produce certification builds trust among producers and consumers, enhancing market negotiation power.

5. Consumer Safety: Ensures that consumers receive safe produce, leading to better health.

6. Economic Return: Provides income from the sale of produce, making the investment worthwhile.

Scope: GAP covers guidelines for the agricultural practices required to produce crops intended for food, such as vegetables, fruits, field crops, spices, and herbs. It encompasses all stages of production at the farm level and post-harvest management, including packaging and/or collecting produce for sale. The objective is to ensure that the produce is safe and of appropriate quality for

consumption, considering environmental impacts and the health, safety, and welfare of workers.

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Processing Banana Flour and Phenolic Compounds from Banana Peels

When processing banana products for sale or export, it is crucial to select high-quality produce according to established standards. Produce that does not meet these standards or has blemishes is often discarded. However, sometimes the flesh of these discarded bananas is still good; only the skin may be unattractive, the shape might be irregular, or the size too small. Therefore, producers turn to processing these bananas.

Processing refers to extending the shelf life of bananas through various methods. Bananas in different conditions can be used for various products. For example:

Kluai Khai: Used for making sweetened bananas, banana in coconut milk, and fried rice cakes with bananas.

Kluai Nāmwā: Used for making sweetened bananas, banana in coconut milk, fried bananas, grilled bananas, banana dessert, banana-stuffed sticky rice, and banana with sticky rice.

Kluai Hak Mook: Used for making sweetened bananas and grilled bananas.

Kluai Hom: Mostly consumed fresh but can also be served with ice cream or in fruit salads. (Stover, R.H., and Simmonds, N.W., 1987, pp. 97-103).

Steps for Processing Bananas into Banana Flour

Selection: Begin by selecting unripe Kluai Nāmwā bananas at about 70-80% maturity, approximately 14-16 weeks from the date the banana bunches emerged. This can also be determined by the angularity of the bananas.

Cleaning: Clean the unripe bananas by washing off dust and dirt.

Blanching: Blanch the bananas in hot water for about 45 seconds, then immediately immerse them in cold water. This process makes peeling easier since unripe bananas have a lot of sap that sticks the flesh to the peel.

Peeling and Slicing: Peel the bananas and slice them thinly. Thin slices help the bananas dry more quickly during the drying process.

Soaking: After slicing, soak the banana slices in a sodium metabisulfite solution to prevent the flesh from darkening.

Drying: Dry the banana slices by either sun drying or using a drying oven at a temperature not exceeding 55°C. Higher temperatures can cause the unripe bananas to lose some of their nutrients.

Grinding: Once dried, grind the banana slices into a fine powder using a grinder.

Sieving: Sieve the ground banana powder through an 80-mesh screen (80 holes per square inch) to obtain fine banana flour.

1.Select raw bananas	2.Wash and Clean	3.Boil in boiling water
4.Soak in cold water	5.Peel	6.cut/Slice
7.Soak in solution	8.Bake dry	9.Grind into powder
10.Sieve the powder	11.Package	12.Banana Powder

Figure 2.1: The 12 steps of banana powder processing process.

Figure 2.4: Photo by Phrakrusophonweranuwat, Director of community enterprises through innovative processes to product standards, Suphanburi Province

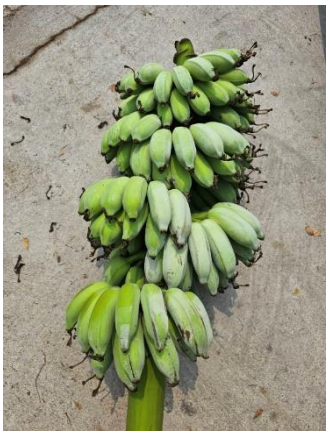


Figure 2.5: Photo by Phrakrusophonweranuwat, Director of community enterprises through innovative processes to product standards, Suphanburi Province

The idea revolves around community enterprise and developing management capabilities for the Conservation Center of Banana Varieties in Suphan Buri Province.

The Conservation Center of Banana Varieties, registered under code 2-7201-02/0012, is located at 8/3 Moo, Rua Yai Subdistrict, Muang District, Suphan

Buri Province 72000. Miss Thannatcha Ketkong serves as the chairperson, contactable at 08-7844-7722. The board comprises seven members: Mr. Wattana Pueaksat, Miss Thanyalak Pongsong, Miss Tatsanee Moam, Miss Waranwrat Pongsong, Mr. Pharaon Meuangwong, Mr. Thanaphak Thansahawiphak, and Mr. Ruchanan Somngam. The organization has 30 members and has been operating as a team.

The guiding principle is to manage existing land to maximize benefits, ensuring sustainable and enduring benefits. Consequently, they cultivate crops and vegetables for consumption and increase value through products such as processed banana and herbs. These products include shampoos, conditioners, tamarind soap, soap with turmeric, and orange soap, all locally made to satisfy broad consumer preferences.

Issues and obstacles include the lack of a clean, safe production facility, distinctive local packaging, and certification for community products. Sales channels are limited. Moreover, economic, socio-cultural, and technological impacts affect operations, with high purchasing costs for crops like tamarind resulting in low profits.

In the future, the group aims to produce banana flour products to increase income and provide a health-conscious option for consumers. They plan to develop a unique identity focusing on the balanced lifestyle of Buddhists living harmoniously with nature. Their goal is to expand internationally through online sales channels. [1]

[1] interview with the Community Enterprise Group at the Banana Variety Conservation Center in Suphan Buri Province, on March 8th, 2022 (Buddhist Era), at 9:35 AM.

Figure 2.7: High angle photo of Suphanburi Banana Conservation Center

The meaning of Small and Micro Community Enterprise (SMCE) has been defined by both academics and related institutions as follows:

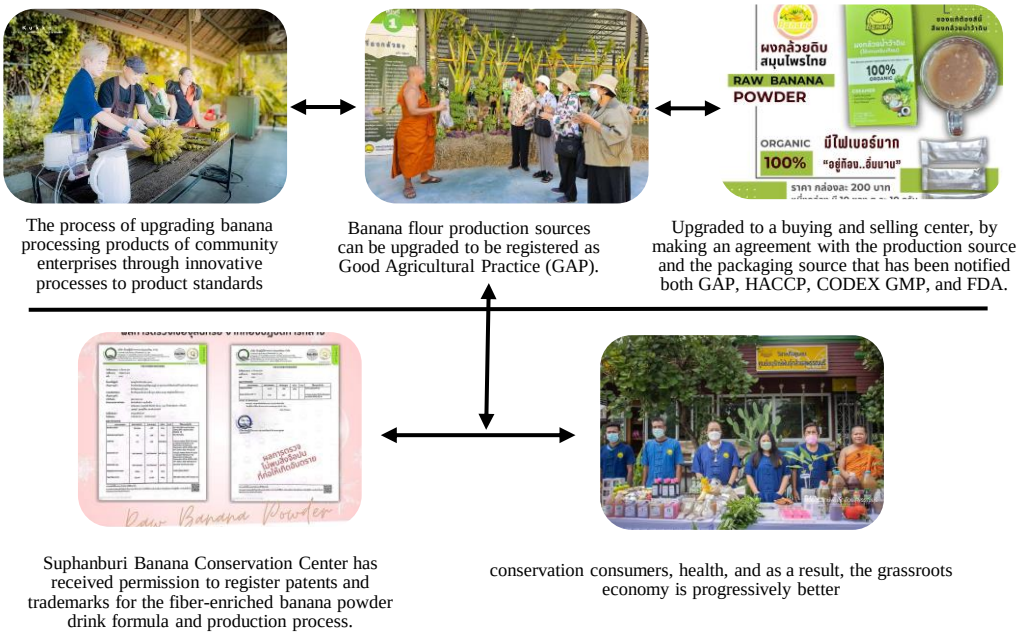
The Community Enterprise Promotion Division (Community Enterprise Registration and Information Group, http://www.sceb.doae.go.th/ 25 October 2023) states that a community enterprise refers to community activities involving the production of goods, provision of services, or other operations managed by a committee that binds together, shares a lifestyle, and collectively engages in these activities, whether as legal entities or not, to generate income and promote self-reliance among families, communities, and between communities.

The Community Enterprise Promotion Act B.E. 2548 (Royal Thai Government Gazette, Volume 122, Section 6A, 18 January 2548, p. 1) defines community enterprise as community activities related to the production of goods, provision of services, or other operations conducted by a committee of individuals bound together, sharing a lifestyle and coming together to engage in such activities, whether as legal entities or not, to generate income and promote self-reliance among families, communities, and between communities.

Seree Pongsakphisit (2009, p. 12) defines Small and Micro Community Enterprise (SMCE) as small-scale enterprises that manage community capital creatively to promote self-reliance and sufficiency among families and communities. Capital here does not only mean money but also includes resources, products, knowledge, cultural assets, and social capital (social norms that tightly bind people to live together as a community, trusted siblings). It enhances sustainability and benefits community owners of such enterprises.

Nalong Petcharaprasit and Pithaya Wongkul (2013, p. 17) describe community enterprise as including the entire process of thinking, managing production, and resources at all stages with the intellectual property of community organizations or community network to develop socio-economic and community learning. It aims not only to make financial profit but also social profit, such as community strength and social peace. Community enterprises begin with community operations managed by the community for the production of goods and services, with group cooperation for product processing, market development, combining local wisdom products to meet community needs, supporting learning, developing economic systems, focusing on community self-reliance, community ownership, and self-management. The products obtained from the process in the community by the community using community innovation combined with local wisdom integrated system activities using learning at the heart of community enterprise development and capable of self-reliance.

New Knowledges



The process of upgrading banana processing products of community enterprises through innovative processes to product standards

Banana flour production sources can be upgraded to be registered as Good Agricultural Practice (GAP).

Upgraded to a buying and selling center, by making an agreement with the production source and the packaging source that has been notified both GAP, HACCP, CODEX GMP, and FDA.

Suphanburi Banana Conservation Center has received permission to register patents and trademarks for the fiber-enriched banana powder drink formula and production process.

conservation consumers, health, and as a result, the grassroots economy is progressively better

Figure 2.8: New Knowledges Diagram of Banana Processing Innovation of the Community Enterprise Center, Banana Conservation Center Suphanburi Province

Conclusions

The integration of people in the community to participate in activities related to maintaining a lifestyle, practicing a profession, managing their resources, managing communities, community businesses related to production, service, or other uses using local wisdom and operating by individuals bound, sharing a lifestyle and coming together to engage in such activities, whether legal entities in any form or not, to generate additional income from the profession of agriculture.

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Interview

Interview with the Banana Germplasm Conservation Community Enterprise Group, at the Banana Germplasm Conservation Center, Suphanburi Province, 8 March 2022, 09:30.am.