Area Based Development Research Journal
Official Translation of วารสารวิจัยเพื่อการพัฒนาเชิงพื้นที่
Thailand Science Research and Innovation
Program Management Unit on Area Based Development
Vol. 16 No. 2 April – June 2024 E-ISSN 2985-1807

Area Based Development Research Journal.2024;16(2) Article No. 256707
http://abcjournal.trf.or.th/

# Upgrading the Benchmarks of Kiriwong Hydro Turbine Nakhon Si Thammarat Province, Thailand Through Participatory Process

**Usa Boonbumroong[1,*], Netithorn Ditnin[1], Attakarn Jansasithorn[1], Anuchit Rodtua[2], Wiwat Sribunnak[3], and Wirat Trichoti[4]**

*[1]Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, Bang Khun Thian, Bangkok, 10150 Thailand*

*[2]Thung Song Technical College, Thung Song District, Nakhon Si Thammarat 80110 Thailand*

*[3]Nakhon Si Thammarat Technical College, Mueang Nakhon Si Thammarat District, Nakhon Si Thammarat Province 80000 Thailand*

*[4]Kiriwong Hydro Turbine Community Enterprise, Lan Saka District, Nakhon Si Thammarat Province 80000 Thailand*

**Corresponding author's E-mail: usa.boo@kmutt.ac.th*

*Received: 31 March 2024 Received in revised form: 7 June 2024 Accepted: 12 June 2024*

## Abstract

The Kiriwong hydro turbine community enterprise in Kam Lon subdistrict, Lan Saka district, Nakhon Si Thammarat province, is a local group that has developed pico hydroelectric turbines with capacities ranging from 0.3 to 1 kW. Currently, 160 of these turbines have been installed in Kam Lon subdistrict and surrounding communities in the Nakhon Si Thammarat mountain range. However, wider expansion is limited due to the product's suitability for specific areas. This research aims to develop and upgrade the innovation benchmarks for the Kiriwong hydro turbine to inclusive innovation by involving the Kiriwong hydro turbine community enterprise, turbine users, educational institutions, local government agencies, and the general public. The approach includes: 1) testing the existing Kiriwong turbines under relevant standards, 2) analyzing the strengths and weaknesses based on test results, 3) increasing the power rated of the turbines to 3 kW, 4) improving the manufacturing process, 5) technology transfer through pilot installations in Kiriwong village, Nakhon Si Thammarat province, 6) studying investment returns, and 7) developing the capabilities of the Kiriwong hydro turbine community enterprise. This results in the creation of the KRW-3000 model (3 kW), which triples electricity production, improves efficiency by 20%, and offers a payback period of one year compared to generators, or four years and four months compared to purchasing electricity from the Provincial Electricity Authority. The cost of electricity produced is 0.26 Baht/kWh. Consequently, the Kiriwong hydro turbine community enterprise's market potential has increased, generating additional revenue of over 500,000 Baht (13,613 USD). Villagers now have alternative electricity generation technology, reducing fuel costs, enhancing family and social stability, and improving local community well-being.

**Keywords:** Nakhon Si Thammarat province, Inclusive innovation, Hydro turbine, Kiriwong village, Electricity generation

Area Based Development Research Journal. 2024;16(2) Article No. 256708
http://abcjournal.trf.or.th/

# Developing Integrated Pest Management for Pomelo Farmers in Baan Paengpuay Community, Buriram Province, Thailand

**Siraprapa Nilsri and Chaiteera Panpakdee***

*Department of Agricultural Extension and Development, Faculty of Agriculture, Khon Kaen University, Muang District, Khon Kaen Province, 40002 Thailand*

**Corresponding author's E-mail: chaitpa@kku.ac.th*

*Received: 20 January 2024 Received in revised form: 4 April 2024 Accepted: 19 April 2024*

## Abstract

Pomelo farmers in Ban Paengpuay, Nangrong District, Buriram Province, Thailand faced challenges due to pest outbreaks, leading to reduced pomelo quality and financial losses. This study aimed to enhance the pest management skills of pomelo farmers and assess the resulting impact. Thirty farmers were selected to participate in the project, which unfolded through the processes of community information gathering, implementation of integrated pest management, and knowledge exchange. Initial steps involved gathering insights from the community to plan project operations. This included collecting community data, organizing forums for diverse perspectives, and devising plans for knowledge transfer. Agricultural extension services helped diagnose plant diseases and pests, identify nutrient deficiencies, and introduce integrated pest management techniques for pomelo cultivation. The second phase focused on implementing pest management techniques tailored to pomelo plots. Methods included mechanical pest control, moth traps with molasses, sticky glue traps, fruit wrapping, and biological pest management using Bacillus subtilis, Bacillus thuringiensis, and Trichoderma Metarhizium. In the third phase, the project facilitated knowledge exchange among participants. Results showed significant improvements, with pomelo production increasing by 85.21 percent. Chemical usage decreased, resulting in savings of 1,200 to 1,400 baht per rai (approximately 234.38-273.44 USD per hectare). Production costs decreased by 2.46 to 2.67 percent, and compliance with Good Agricultural Practices (GAP) standards increased by 30 percent, with 11 farmers obtaining certification. Furthermore, pomelo farmers showed a significant increase in knowledge, with a 124.04 percent improvement. This led to better problem analysis skills and increased capacity for exchanging insights. Participants also demonstrated higher confidence and commitment to self-improvement and the advancement of pomelo production practices.

**Keywords**: Buriram province, Farmer, Pomelo, Integrated Pest Management, Plant disease

Area Based Development Research Journal. 2024;16(2) Article No. 256709
http://abcjournal.trf.or.th/

# Knowledge Transfer and Expansion of the Bio-waste Disposal System Using Black Soldier Fly Larvae in Chiang Klang District, Nan Province, Thailand

**Yuthana Phimolsiripol[1,2*] Pinpanit Boonchuay[1], Piyanuch Roskhrua[3], Jiraporn Kulsarin[1], Chonthicha Uthaisripadungkul[1], Piyachat Sahaschat[1], Kamonporn Sitthitrai[1], Suwit Chotinan[4] and Montree Chiawsuwan[5]**

*[1]Food Innovation and Packaging Center, Chiang Mai University, Muang District, Chiang Mai Province, 50100 Thailand*

*[2]Faculty of Agro-Industry, Chiang Mai University, Muang District, Chiang Mai Province, 50100 Thailand*

*[3]Faculty of Science and Agricultural Technology, Rajamangala University of Technology Lanna Nan, Phu Phiang District, Nan Province, 55000 Thailand*

*[4]Faculty of Veterinary Medicine, Chiang Mai University, Muang District, Chiang Mai Province, 50100 Thailand*

*[5]Agricultural Learning Center Ban Ratchada, Chiang Klang District, Nan Province, 55160 Thailand*

**Corresponding author's Email: yuthana.p@cmu.ac.th*

*Received: 27 March 2024 Received in revised form: 1 June 2024 Accepted: 5 June 2024*

## Abstract

Chiang Klang District, Nan Province, faces challenges in bio-waste management, including insufficient cooperation in waste separation, inadequate budget and personnel, and an incomplete waste disposal system that does not cover all areas. This research aims to disseminate knowledge and expand the implementation of Black Soldier Fly Larvae (BSFL) cultivation for bio-waste disposal in Chiang Klang District by establishing learning processes and knowledge management. The goal is to enhance the community's knowledge acquisition capabilities and create prototype learning spaces for innovation with 50 selected community innovators. The study began by providing education on the nutritional aspects of BSFL, cultivation techniques, housing and equipment management, harvesting, and the application of BSFL as an ingredient in animal feed. This was accomplished through expert lectures, study visits, hands-on practice, and instructional videos. The next steps involved conducting a nutritional analysis of the BSFL produced by the community to evaluate its application as an animal feed ingredient, designing a bio-waste management system at the prototype farm in Nan Province, and enhancing prototype farm housing to comply with hygiene principles. The study produced five instructional videos. Additionally, the cultivated BSFL met quality standards as a high-protein feed ingredient for egg-laying hens and indigenous chickens. Utilizing BSFL as feed for egg-laying hens and indigenous chickens reduced production costs by 3.13 Baht (around 0.085 USD) per egg and 30.12 Baht (around 0.82 USD) per kilogram, respectively, and increased income from vegetable cultivation by 61%. The community participated in designing infrastructure layouts that align with the local context. Ten prototype farms were established to expand results and create learning networks in the area. Collaborative policy recommendations were developed with the Chiang Klang Subdistrict Municipality to ensure the sustainability and longevity of the waste management system employing BSFL. Furthermore, cooperation with the National Bureau of Agricultural Commodity and Food Standards was conducted to expand results and promote the utilization of BSFL.

**Keywords**: Nan Province, Bio-waste, Black Soldier Fly, Poultry feed, Prototype area

Area Based Development Research Journal.2024;16(2) Article No. 256710
http://abcjournal.trf.or.th/

# Quality Improvement of the Fishery Products from Songkla lake using Good Manufacturing Practices, Banchongfuen Fishing Community, Phatthalung Province, Thailand

**Amonrat Thanonkaew[1,*], Vilailak Klompong[1] and Benjawan Pengnoo[2]**

*[1]Department of Food Science and Technology, Faculty of Agro- and Bio-Industry, Thaksin University, Papayom District, Phatthalung Province, 93210 Thailand*

*[2]Thai Sea Watch Association, Muang District, Songkhla Province, 90100 Thailand*

*Corresponding author's E-mail: tamonrat@tsu.ac.th*

*Received: 24 January 2024 Received in revised form: 11 April 2024 Accepted: 25 April 2024*

## Abstract

In Banchongfuen, Khomak sub Pakpayoon district, Phatthalung province, there were 24 fishery product producers who specialized in dried fishery products such as dried shrimp, dried ponyfish, dried spotted catfish, dusky-hairpin anchovy, and dried shortnose gizzard shad. However, these products did not meet certification standards for Good Manufacturing Practices (GMP) and Thai Food and Drug Administration (FDA). The Banchongfuen community group lacked the technology and facilities needed for fishery product processing at the community enterprise level. Their GMP scores were below 60% across all six aspects. The objective of this research was to improve the quality of fishery products to increase their value and establish community acceptance within the target community. The operation involved developing fishery product processing procedures to meet GMP standards, including locations and production buildings, production equipment and utensils, process control, sanitation, maintenance and cleaning, and personnel. The following step was applying for FDA certification for fishery products by requesting permission from the food production facility and obtaining an FDA number. As a result, products from Banchongfuen received certification of a food production location number (93-2-00465) from the Phatthalung Provincial Public Health Office. They proceeded to apply for FDA certification, and seven products successfully passed the certification process. These products included: 1) dried shrimp chili paste (93-2-00465-6-0001), 2) sun dried ponyfish (93-2-00465-6-0002), 3) dried shrimp with shell (93-2-00465-6-0003), 4) shrimp flavored rice seasoning (93-2-00465-6-0004), 5) sweet shrimp (93-2-00465-6-0005), 6) sun dried yellow shrimp (93-2-00465-6-0006) and 7) spotted catfish flavored rice seasoning (93-2-00465-6-0007). The income of the fishery product producers in Banchongfuen increased by 78.14% through selling fishery products, addressing issues for community-level entrepreneurs and adding value to fishery products.

**Keywords:** Phatthalung province, Good Manufacturing Practices, Fishery product, Food processing, Dried food

Area Based Development Research Journal.2024;16(2) Article No. 256711
http://abcjournal.trf.or.th/

# Designing and Developing Apparel Products from Local Woven Fabric of Nan Province, Thailand

**Rueankhwan Roonreangjai**
*Faculty of Industrial Technology, Uttaradit Rajabhat University, Mueang District, Uttaradit 53000 Thailand*
**Corresponding author: rueankhwan.uru@gmail.com*
*Received: 10 January 2024 Received in revised form: 27 March 2024 Accepted: 5 April 2024*

**Abstract**

Thai Lue Woven Fabric with Natural Color from Ban Don Moon Village, Ban Chao Luang Weaving Community Enterprise Group, and Prapassorn Woven Fabric of Nan are local weaving groups in Nan Province, Thailand. These groups were formed by local people to create job opportunities based on the weaving culture. However, their weaving products have faced limitations in design and response to current consumer demands. This research aims to modernize apparel products made from the cultural capital of woven fabric from each group. The goal is to convey the uniqueness of the local woven fabric and add value to expand the customer base through a collaborative network of members and related individuals. The research process includes: 1) analyzing potential and setting goals, 2) generating ideas for the design and development of local weaving products, 3) designing and developing the products, 4) creating drawings of apparel products from the local woven fabric, 5) producing prototype apparel products, 6) promoting product processing skills, and 7) testing the market for prototype apparel products. All groups collaborated to define ideas for design and development, including color tones and materials. They developed production capabilities, prototyping, and patterning, promoted sewing skills within the network, and mixed materials from network members to create modern apparel products. This effort aimed to build a business community based on interdependence. As a result, Thai Lue Woven Fabric with Natural Color from Ban Don Moon Village incorporated dyeing and weaving techniques obtained from mixed processed fibers. The research produced 8 designs of apparel products from local woven fabric, which could be distributed at higher prices, resulting in a 45% - 100% price increase. This added value to the woven fabric by an average of 63.29%. Consumers expressed high satisfaction with the products, which could help preserve cultural heritage for future generations.

**Keywords** Nan Province, Thai Lue, Woven fabric, Apparel, Cultural capital

Area Based Development Research Journal.2024;16(2) Article No. 256712
http://abcjournal.trf.or.th/

# Phuan Fusion Recipe: Upgrading Thai Phuan's Cuisine for Tourism in Hat Siao Sub-district, Sukhothai Province, Thailand

**Chunkamol Panyayong[1,*], Chawalit Raksarikorn[2] and Taweesit Panyayong[3]**

*[1]Department of Food and Nutrition, Faculty of Science and Technology, Uttaradit Rajabhat University, Muang District, Uttaradit Province, 53000 Thailand*

*[2]Department of Agriculture, Faculty of Agriculture, Uttaradit Rajabhat University, Muang District, Uttaradit Province, 53000 Thailand*

*[3]Department of Mathematics, Faculty of Education, Uttaradit Rajabhat University, Muang District, Uttaradit Province, 53000 Thailand*

**Corresponding author: chunkamol.pan@uru.ac.th*

*Received: 17 November 2023 Received in revised form: 31 March 2024 Accepted: 5 April 2024*

## Abstract

In Hat Siao Sub-district, Si Satchanalai District, Sukhothai Province of Thailand, there exists a unique style of Thai Phuan food characterized by its use of local ingredients such as fish, vegetables, and seasonal forest products. This culinary tradition emphasizes simplicity and natural flavors, avoiding the use of artificial additives. Despite the rich culinary heritage, efforts to attract tourists to this area have been lacking. This study aims to address this gap by developing Phuan Fusion food recipes tailored for tourism and creating innovative tourism activities centered around Phuan Fusion cooking. The key objectives include: 1) developing Phuan Fusion recipes that appeal to different types of tourists, 2) creating engaging tourism activities to showcase Phuan Fusion cooking, 3) enhancing the capabilities and potential of network partners involved in tourism, 4) testing the effectiveness of the developed tourism activities, 5) collaborating and learning with network partners to improve the tourism offerings. The study has identified 15 Phuan Fusion food recipes that cater to six types of tourists, along with three travel routes. Additionally, Good Agricultural Practices have been implemented, and farm stay options have been introduced to enhance the tourism experience. The innovative tourism activities include guided tours to orange orchards with demonstrations of safe agricultural practices, Phuan Fusion food cooking classes, and an immersive experience showcasing Phuan Fusion food preparation. As a result of these efforts, the community has been able to preserve the identity of traditional Thai Phuan food while creating new Phuan Fusion recipes tailored for creative tourism activities. This has had a positive economic impact, with each tourist contributing an income of 580 baht (approximately 15.70 USD), leading to a monthly increase in community income of 48,333 baht (approximately 1308 USD).

**Keywords**: Sukhothai province, Thai Phuan, Food recipes, Phuan fusion, Travel routes