

Sustainable Development of a Healthier Community:

Collaborating with the Farmers of Kham Koon Center to Encourage Good
Agricultural Practices (GAP)





Sponsored By:

The Sustainable Community Development Foundation (SCDF)

Authors:

Napatsorn Chadanutkul, Chulalongkorn University

Sophia Islam, Worcester Polytechnic Institute

Sophia Mularoni, Worcester Polytechnic Institute

Pakkarin Putpongphaew, Chulalongkorn University

Theresa Rosato, Worcester Polytechnic Institute

Yavitha Siri-u-vithtaya, Chulalongkorn University

Surangkana Srichantamit, Chulalongkorn University

Joelis Velez Diaz, Worcester Polytechnic Institute

Submitted to:

Prof. Steve Taylor, Worcester Polytechnic Institute

Prof. Rosemary Taylor, Worcester Polytechnic Institute

Prof. Dr. Supawan Tantayanon, Chulalongkorn University

Assist. Prof. Dr. Numpon Insin, Chulalongkorn University

Assist. Prof. M.L. Siripastr Jayanta, Chulalongkorn University

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Abstract

The overuse of pesticides in agricultural practices poses serious threats to human health. Through our work with the Sustainable Community Development Foundation (SCDF), the team aimed to improve the health of the Kham Koon Center community through encouraging Good Agricultural Practices (GAP) and collaboration with local farmers to create educational materials and build a foundation for the establishment of a Community of Practice, with the hope of improving community health.

Acknowledgements

Several people had participated and contributed to the success of this project. The team would like to recognize the support from our sponsor, Sustainable Community Development Foundation (SCDF) and its founder, Dr. Tantip Thamrongvarangoon for her immense support. Without her help in communicating and organizing meetings with various people, the project will not be completed as efficiently.

As per the project title, the project involved the collaboration between the team and farmers under the Kham Koon Center. The team would like to acknowledge the following ten farmers under the Kham Koon Center for their kind hospitality and diligent involvement in this project.

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| 1. นางสาวนันท์ จ้าแก้ว | 6. นางนิรันดร์ จ้าแก้ว |
| 2. นางทองแถม ทองโคตร | 7. นายกิมไฉ่ หม่เที่ยง |
| 3. นางกุลณี หนองโยธา | 8. นางทองเลื่อน ผาจวง |
| 4. นางทองคำ มณีสา | 9. นางอุรา ศรีวัตร |
| 5. นางพัน ชมพุด | 10. นางบุญจันทร์ ห้วยจันทร์ |

The team had received many useful comments and were very glad to be able to spend time visiting each of their farms.

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Executive Summary

The overuse of chemicals that is prominent in modern agricultural practices causes serious environmental damage and poses a threat to human health. Though pesticides are advantageous for managing weeds and insects, especially in current-day cash-cropping, issues arise when they move from their intended target area through various processes, such as leaching, surface runoff, spray drift, and more (Tudi et al., 2021). Through these avenues, water sources and the ambient air are polluted, contaminating local produce that is then consumed. The damage inflicted by these chemicals on ecosystems impacts other resources too; for example, in aquatic environments, high amounts of phosphorus, caused by pesticide contamination, limit the nutrients and oxygen fish require to live (Sivaranjani and Rakshit, 2019). Moreover, human health issues can result from long-term exposure to these chemicals, including respiratory insufficiency and illness, tremors, muscle weakness, paralysis, confusion, and neurologic dysfunction (Sapbamrer et al., 2014). Due to the unsustainable nature of pesticides, organic farming has emerged as a possible solution. When implemented correctly, organic farming can better protect water and air sources from contaminants because of its ability to recycle nutrients within the farm and keeps harmful chemicals out of the bodies of consumers.

With the goal of improving the health of their community and ultimately reducing the number of unnecessary hospital admissions, our sponsor, the Sustainable Community Development Foundation (SCDF), which is an initiative of the Ubonrat Hospital, gathered farmers to be part of the Kham Koon Center. There, they encourage and teach farmers about improved farming practices. In order to help our sponsor, one of the community leaders of the Kham Koon Center and a founder of SCDF, Dr. Tantip Thamrongvarangoon, with this goal of improving community health, the team developed three objectives:

1. Understand the current farming procedures used by farmers under Kham Koon Center and the level of trust of consumers purchasing produce at the Ubonrat Hospital stalls
2. Gain a better understanding of the GAP certification process and methods for improved farming practices.
3. Collaborate and support farmers under Kham Koon Center in applying for GAP certification and using healthier farming practices.

As a first step, the team focused on gaining a better understanding of the current farming procedures within the Kham Koon Center, allowing us to determine what was most feasible. The **discussions with the founder of SCDF, literature reviews, farmer interviews, and observations, and the distribution of a Knowledge Attitudes and Practices (KAP) and Hospital market consumer surveys** informed our decision to proceed with a Good Agricultural Practices (GAP) certification from the Thailand Department of Agriculture over any form of organic certification, such as the Participatory Guarantee System (PGS). The team pursued this avenue of improving community health because many of the PGS and other organic farming requirements, such as clean water sources, organic seeds, and fencing to keep wild animals out, would not have been feasible given the current farming conditions, especially in a community where organic goods do not necessarily sell at a higher price. The cost of transitioning to organic farming is already difficult to take on, and this is made even more challenging when the local organic market does not typically generate additional income. Despite this, it was still important to ensure that farmers employ better farming practices, an initiative they lacked knowledge on yet were passionate about because of the positive impact it would have on the community's health.

After determining that the GAP certification would be more feasible for the Kham Koon Center, the team also decided to create educational materials and hold a collaborative workshop with the farmers to gain feedback and empower them to gain the certification. The

Workshop applied the principles of Participatory Action Research (PAR), which involved our team receiving constructive feedback on the effectiveness and level of engagement of our infographics and handbook in order to better suit the target audience. The team also assisted the farmers in applying for GAP certification, filling out traceability record sheets, and learning to use a LINE application as a means of accountability and preparedness for the GAP certification inspection. The team created the **Traceability record sheet** and a **LINE group chat** because the team learned that one of the main issues the farmers face in getting a certification is not having any mature crops ready for the officials to evaluate on the inspection date. The workshop fostered an environment in which the team was able to learn from the farmers, while the farmers simultaneously learned from our team, giving the collective the opportunity to participate and listen to the farmers' expert opinions on some important issues within the community.

After the workshop, the team analyzed and applied constructive feedback from the farmers to the educational materials. The project deliverables that will help the farmers eventually obtain the GAP certification include **a group chat in LINE application, a traceability record sheet, farming practices and GAP handbook, and infographics.**

LINE application is a messaging application that allows users to send and receive text messages, voice, and video calls, share photos, videos, and other files. LINE application also offers a number of additional features, such as group chats, social networking, and various games and content provided through partnerships with other companies.

The **infographic posters** detail practices that can be easily improved upon, as well as the benefits of GAP, and hung around the Hospital and Kham Koon Center. The 'practices' **infographic** is intended to display how easy it can be to take a few steps to produce better food and discourage chemical usage. The **handbook** can be used as a step-by-step guide to the GAP application process, along with the implementation of improved methods for pest

control, fertilizer, and proper chemical use. With the support of these materials, this crucial information will be readily available to the farmers who wish to adjust their practices for the betterment of their community.

The team obtained several findings from interviews, collaborative workshops, and observations, which provided valuable data for our research. Findings one to four provided the team with the necessary data to shift our focus from organic to GAP, which was obtained from meeting with one of the founders of SCDF, interviews with farmers, observing farmer's plots, and surveys. Finding one to four are listed below:

1. Consumer trust already exists in this community.
2. Improper use of pesticides is negatively impacting the health of the community.
3. Currently, it is not feasible for this community to obtain organic certification.
4. Farmers are interested in adjusting their practices and obtaining GAP certification.

Findings five and six improved our understanding of the GAP certification process and methods. The results were obtained from interviews with the operator of the SAFETist farm in Bangkok, the World Vegetable Center (WVC), and the inspectors from the Department of Agriculture in Khon Kaen. Finding five and six are listed below:

5. There are alternative, safer farming techniques for farmers to implement in their own practices to make GAP certification easier.
6. The absence of preparedness for GAP inspection represents a significant barrier to certification.

In a collaborative workshop with farmers under the Kham Koon Center, the last two findings were obtained that led to improved community health. Finding seven and eight are listed below:

7. Farmers have an insufficient understanding of the certification process, resulting in knowledge gaps.
8. Collaboration with the community is essential for achieving common goals and promoting sustainable habit changes.

Furthermore, the team recommends that the use of materials provided by the team can serve as a foundation to establish a Community of Practice (CoP) within the Kham Koon Center in order to sustain the enhancement of community health.

Looking into the future, farmers who desire official organic certification through the PGS system can utilize GAP certification as a stepping stone. Though locally there are many obstacles to overcome in the pursuit of this, it may be worthwhile in the coming years, and those engaged in GAP agriculture will be able to make this transition more easily. Beyond acting as a first step towards becoming organic, GAP will improve the health of this community through the betterment of the produce that is sold and consumed. Both our **infographics** and **handbook** will help in recruiting more farmers to join the GAP initiative, increasing the overall impact of the project. Through the dedication of the farmers at the Kham Koon Center, proper pesticide usage techniques and other, beneficial farming strategies will protect the local welfare, preventing illness at its roots.

Executive Summary บทสรุปโครงการ

การใช้สารเคมีมากเกินไปในอุตสาหกรรมเกษตรยังคงเป็นปัญหาหลักในการเกิดผล กระทบต่อสิ่งแวดล้อมรวมถึงสุขภาพของผู้ผลิตและผู้บริโภค แม้ว่าในปัจจุบันสารกำจัดศัตรูพืชจะมีประโยชน์ต่ออุตสาหกรรมเกษตรในการจัดการวัชพืชและแมลง แต่สารกำจัดศัตรูพืชเหล่านี้ก็มีโทษเช่นกัน เมื่อสารเหล่านี้กระจายไปในพื้นที่อื่นๆ แหล่งน้ำและอากาศโดยรอบจึงปนเปื้อนไปด้วยสารเคมีอันตราย ที่ส่งผลไปยังผลผลิตในท้องถิ่นและต่อเนื่องไปยังผู้บริโภคในที่สุด นอกจากนี้สารเคมียังส่งผลกระทบต่อระบบนิเวศและทรัพยากรอื่นๆ เช่น การตรวจพบฟอสฟอรัสปริมาณสูงในน้ำ จากการปนเปื้อนของยาฆ่าแมลง ทำให้ออกซิเจนและสารอาหารในน้ำที่จำเป็นต่อการดำรงชีวิตของปลาลดลงและมากไปกว่านั้น ยังก่อให้เกิดปัญหาสุขภาพ เช่น ภาวะการหายใจบกพร่อง อาการมือไม้สั่น กล้ามเนื้ออ่อนแรง อัมพาต อาการสับสน และความผิดปกติของระบบประสาท ซึ่งเป็นผลมาจากการได้รับสารเคมีเหล่านี้เป็นเวลานาน เนื่องจากสารกำจัดศัตรูพืชส่งผลกระทบต่อคุณภาพชีวิตของผู้คน การเกษตรอินทรีย์จึงกลายเป็นหนึ่งในทางเลือกของเกษตรกรในการป้องกันสารปนเปื้อนไม่ให้สะสมอยู่ในแหล่งน้ำและอากาศ การรีไซเคิลสารอาหารภายในฟาร์มและยังป้องกันไม่ให้สารเคมีที่เป็นอันตรายตกมาสู่ร่างกายของผู้บริโภคได้

ด้วยวิสัยทัศน์ที่ต้องการพัฒนาความเป็นอยู่ของคนในชุมชน เป้าหมายการลดจำนวนผู้ป่วยที่เข้ารับการรักษาในโรงพยาบาลด้วยการเสริมสร้างสุขภาพและสุขอนามัยของคนในชุมชนปลอดภัยจากโรคต่างๆที่เกิดจากการบริโภคสารปนเปื้อนในอาหารและผักชนิดต่างๆที่ปลูกโดยเกษตรกรท้องถิ่น มูลนิธิเพื่อการพัฒนาที่ยั่งยืนและโรงพยาบาลอุบลรัตน์ จึงเชิญชวนและรวบรวมเกษตรกรในชุมชนให้เป็นส่วนหนึ่งของ ศูนย์การเรียนรู้คำคุณ โดยเกษตรกรจะได้รับทั้งความรู้และการสนับสนุนในด้านต่างๆเพื่อที่จะพัฒนาการปฏิบัติทางการเกษตรของตนเองให้ปลอดภัยมากยิ่งขึ้น เพื่อให้เกิดประโยชน์ทั้งทางด้านสุขภาพและด้านสิ่งแวดล้อมต่อตัวเกษตรกรและผู้บริโภคในชุมชน

โครงการนี้จัดทำขึ้นเพื่อเป็นการสนับสนุนเป้าหมายของมูลนิธิและโรงพยาบาลอุบลรัตน์ในการพัฒนาความเป็นอยู่ของเกษตรกรและคนในชุมชน โดยกลุ่มนิสิตได้กำหนดวัตถุประสงค์ขึ้นมาทั้งหมด 3 ประการ ได้แก่

1. สำรวจพฤติกรรมการปฏิบัติทางการเกษตรเบื้องต้นของเกษตรกรภายใต้ศูนย์คำคุณ และสำรวจความคิดเห็นและความเชื่อมั่นของผู้บริโภคที่มีต่อผลผลิต โดยเฉพาะผลผลิตจากเกษตรอินทรีย์
2. ศึกษาและทำความเข้าใจในหลักการและขั้นตอนการขอรับรองการปฏิบัติทางการเกษตรที่ดี (GAP) รวมถึงแนวทางและวิธีการต่างๆในการพัฒนาการปฏิบัติทางการเกษตรเพื่อให้ได้ผลผลิตที่ปลอดภัยและมีคุณภาพ
3. ร่วมมือและสนับสนุนเกษตรกรภายใต้ศูนย์คำคุณในการเตรียมตัวสมัครเพื่อขอใบรับรอง GAP และส่งเสริมการพัฒนาการปฏิบัติทางการเกษตรให้มีความปลอดภัยมากยิ่งขึ้น

ในการดำเนินงาน กลุ่มนิสิตให้ความสำคัญในการทำความรู้จักเบื้องต้นกับชุมชนอุบลรัตน์และศูนย์คำคุณ เพื่อนำข้อมูลเหล่านี้ไปใช้ในการวางแผนการโครงการได้อย่างเหมาะสม กลุ่มนิสิตได้ศึกษาค้นคว้างานวิจัยต่างๆเพื่อเป็นรากฐานเชิงวิชาการ สนทนาแลกเปลี่ยนความคิดเห็นกับ แพทย์หญิง ทานทิพย์ อำนวยวรานุวัตร ผู้ก่อตั้งมูลนิธิเพื่อการพัฒนาที่ยั่งยืน สัมภาษณ์และสำรวจความรู้ ทักษะและการปฏิบัติ ร่วมกับเกษตรกรภายใต้ศูนย์คำคุณ และสังเกตการณ์ในระหว่างเข้าเยี่ยมชมแปลงของเกษตรกร จากข้อมูลจริงในพื้นที่ทำให้กลุ่มนิสิตคำนึงได้ว่าเนื่องจากมาตรฐานทางเกษตรอื่นๆ เช่น มาตรฐานเกษตรอินทรีย์ นั้นมีกฎเกณฑ์และข้อบังคับที่เกษตรกรในชุมชนอุบลรัตน์ยังไม่สามารถปฏิบัติ หรือเปลี่ยนแปลงให้เป็นไปตามข้อบังคับเหล่านั้นในเวลาอันสั้นได้ ยกตัวอย่างเช่น การจัดหาแหล่งน้ำที่สะอาด การหาเมล็ดพันธุ์อินทรีย์ หรือแม้กระทั่งการต่อเติมรั้วล้อมรอบแปลงผักเพื่อป้องกันผลผลิตจากการปนเปื้อนของสัตว์ต่างๆ กลุ่มนิสิตจึงสรุปได้ว่า มาตรฐาน GAP เป็นทางเลือกเบื้องต้นที่มีความเหมาะสมมากที่สุดสำหรับคนในชุมชนอุบลรัตน์ที่สามารถนำไปขยายผลสู่มาตรฐานที่เข้มงวดต่อไป

เนื่องจากการทำเกษตรอินทรีย์ในปัจจุบันมีต้นทุนสูงและมีขั้นตอนการปฏิบัติที่ซับซ้อนทำให้เกษตรกรไม่สามารถเพิ่มรายได้ให้มากขึ้นกว่าเดิมได้ ปัจจุบันเกษตรกรเริ่มตระหนักว่าการทำเกษตรโดยใช้สารเคมีจะเพิ่มปริมาณผลผลิตและเพิ่มรายได้ให้กับตนเอง แต่หากจะต้องแลกมาด้วยผลกระทบต่างๆด้านสุขภาพที่เกิดจากการใช้สารเคมีจะเกิดผลเสียมากกว่าผลดี จึงได้หันมาสนใจการทำเกษตรที่ดีและปลอดภัย ผู้คนในชุมชนอุบลรัตน์มีความต้องการที่จะเปลี่ยนแปลงเพื่อให้มีสุขภาพที่ดีและแข็งแรง เพราะอย่างไรก็ตามสิ่งสำคัญที่มากกว่าการ

สร้างรายได้คือการพัฒนาความเป็นอยู่และสุขภาพของผู้คน ซึ่งการปฏิบัติตาม GAP ที่เป็นแนวทางการพัฒนา และแก้ไขปัญหา นั้น มีความสอดคล้องกับความตั้งใจของผู้คนในชุมชนอุบลรัตน์อยู่แล้ว เพียงแต่ขาดความรู้ที่จะ ปฏิบัติอย่างถูกต้องและการสนับสนุนจากหน่วยงานต่างๆ

หลังจากได้วิเคราะห์ข้อมูลโดยละเอียดและได้ข้อสรุปว่าการรับรองมาตรฐาน GAP ซึ่งเป็นขั้นพื้นฐานสู่ การรับรองมาตรฐานเกษตรอินทรีย์ (PGS) ที่จะช่วยพัฒนาการปฏิบัติทางเกษตรให้ปลอดภัยต่อผู้ผลิตและ ผู้บริโภคในชุมชนอุบลรัตน์มากยิ่งขึ้น และมีความเหมาะสมกับเกษตรกรภายใต้ศูนย์คำคุณมากกว่ามาตรฐานการ รับรองอื่นๆ กลุ่มนิสิตจึงตัดสินใจจัดทำสื่อการเรียนรู้และจัดการประชุมเชิงปฏิบัติร่วมกับเกษตรกร เพื่อให้ได้รับ ความรู้เพิ่มเติมโดยใช้หลักการของการวิจัยเชิงปฏิบัติการแบบมีส่วนร่วม (พี เอ อาร์) การประชุมเชิงปฏิบัติจะช่วย ส่งเสริมสภาพแวดล้อมให้กลุ่มนิสิตสามารถการเรียนรู้ร่วมไปกับเกษตรกร เปิดโอกาสให้ผู้เข้าร่วมทุกคนมีส่วนร่วม และรับฟังความเห็นจากผู้เชี่ยวชาญในประเด็นสำคัญต่างๆ ในชุมชน ทางกลุ่มนิสิตได้ทำการสอบถามความคิดเห็น และข้อเสนอแนะจากเกษตรกรเกี่ยวกับประสิทธิภาพของอินโฟกราฟิกและคู่มือที่ทางนิสิตได้จัดทำขึ้น และนำ ข้อคิดเห็นเหล่านั้นมาพิจารณาและปรับปรุงให้เหมาะสมกับกลุ่มเป้าหมายมากยิ่งขึ้น

กลุ่มนิสิตได้ช่วยเหลือเกษตรกรในการกรอกใบสมัครและจัดเตรียมเอกสารที่จำเป็นในการสมัครขอรับรอง GAP นิสิตยังได้เข้าสัมภาษณ์ผู้เชี่ยวชาญด้านการตรวจสอบแปลงจากกรมวิชาการเกษตร และทราบว่า สาเหตุที่ ทำให้เกษตรกรส่วนใหญ่ไม่ผ่านการรับรอง เกิดจากการเตรียมตัวที่ไม่สมบูรณ์ มีเกษตรกรจำนวนมากที่ไม่มีผลผลิตที่ โตเต็มที่สำหรับการตรวจสอบและไม่มีการจดบันทึกกิจกรรมในแปลง เพื่อแก้ไขปัญหาเหล่านี้ กลุ่มนิสิตได้จัดทำ ใบบันทึกการตรวจสอบย้อนกลับและชี้แนะวิธีการจดบันทึกให้กับเกษตรกร และใช้แชทกลุ่มในแอปพลิเคชัน LINE เป็นตัวกลางในการสื่อสารและแจ้งเตือนเกษตรกรในการเตรียมพร้อมสำหรับการตรวจสอบแปลง และ ใช้สำหรับ บันทึกข้อมูลรูปภาพกิจกรรมในแปลงของเกษตรกร โดยแอปพลิเคชัน LINE เป็นแอปพลิเคชันรับส่งข้อความที่ช่วย ให้ผู้ใช้งานสามารถส่งและรับข้อความ เสียง และวิดีโอ แชร์รูปภาพ วิดีโอ และไฟล์ต่างๆ อีกทั้งยังมีคุณสมบัติ เช่น การ แชทเป็นกลุ่ม การเชื่อมโยงกับเครือข่ายสังคมออนไลน์ และการเล่นเกมหรือเนื้อหาต่างๆ ที่ให้บริการผ่านบริษัทใน เครือพันทิตร

อินโฟกราฟิกที่กลุ่มนิสิตจัดทำขึ้นในรูปแบบโปสเตอร์ แสดงเนื้อหาต่างๆ เช่น ความหมายของการปฏิบัติทางการเกษตรที่ดี (GAP) แนวปฏิบัติทางการเกษตรที่สามารถนำมาปรับใช้ได้ และ ประโยชน์ของการปฏิบัติตาม GAP แนวทางการปฏิบัติทางการเกษตรที่ดี (GAP) ผ่านอินโฟกราฟิก มีจุดประสงค์เพื่อแสดงให้เกษตรกรเห็นว่าการไม่สนับสนุนการใช้สารเคมีและขั้นตอนการผลิตอาหารที่ปลอดภัยนั้นสามารถทำได้ง่ายดายและส่งผลดีต่อชุมชน

ในส่วนของผู้มือการปฏิบัติทางการเกษตรที่ดี กลุ่มนิสิตได้จัดทำขึ้นเพื่อให้คำแนะนำเกี่ยวกับขั้นตอนการสมัครขอใบรับรอง GAP ควบคู่ไปกับวิธีการควบคุมศัตรูพืช ปุ๋ย และการใช้สารเคมีที่เหมาะสม โดยคู่มือฉบับนี้สามารถนำไปเผยแพร่ให้กับเกษตรกรอื่นๆในชุมชน ที่สนใจปรับเปลี่ยนแนวทางการปฏิบัติทางการเกษตรให้มีความปลอดภัยได้อีกด้วย

อินโฟกราฟิกและหนังสือคู่มือที่จัดทำขึ้น สามารถใช้เป็นสื่อการเรียนรู้เพื่อโน้มน้าวเกษตรกรจำนวนมากให้มาเข้าร่วมโครงการการปฏิบัติทางการเกษตรที่ดีและส่งผลให้โครงการนี้มีความน่าเชื่อถือและมีประสิทธิภาพมากยิ่งขึ้น

กลุ่มนิสิตได้ตั้งข้อค้นพบที่มีประโยชน์สำหรับโครงการวิจัยทั้งหมดแปดข้อ จากการสัมภาษณ์ การประชุมเชิงปฏิบัติ การสังเกตและสำรวจ ข้อค้นพบที่หนึ่งถึงสี่ ให้ข้อมูลที่จำเป็นในการเปลี่ยนจุดประสงค์ของโครงการจากการปฏิบัติแบบเกษตรอินทรีย์ไปสู่ GAP ซึ่งข้อค้นพบทั้งสี่นี้ เกิดขึ้นจากการประชุมกับหนึ่งในผู้ก่อตั้ง SCDF การสัมภาษณ์เกษตรกร การสังเกตและสำรวจแปลงของเกษตรกร ข้อค้นพบเหล่านี้คือ

1. ผู้บริโภคในชุมชนอุบลรัตน์มีความไว้วางใจในผลิตภัณฑ์อยู่แล้ว
2. การใช้สารกำจัดศัตรูพืชที่ผิดวิธี ส่งผลกระทบต่อสุขภาพของคนในชุมชนอุบลรัตน์
3. ชุมชนอุบลรัตน์ยังไม่สามารถขอการรับรองเกษตรอินทรีย์ได้
4. เกษตรกรมีความสนใจที่จะเปลี่ยนวิธีการปฏิบัติและขอรับการรับรอง GAP

ข้อค้นพบที่ห้าและหกช่วยให้กลุ่มนิสิตเข้าใจกระบวนการและวิธีการรับรอง GAP มากยิ่งขึ้น ซึ่งทั้งสองข้อค้นพบนี้ได้มาจากการสัมภาษณ์ผู้ดำเนินการฟาร์ม SAFETist ในกรุงเทพมหานคร World Vegetable Center (WVC) และผู้ตรวจสอบจากกรมวิชาการเกษตรในจังหวัดขอนแก่น ข้อค้นพบเหล่านี้คือ

5. เกษตรกรสามารถเลือกใช้และเปลี่ยนแปลงแนวทางการปฏิบัติทางเกษตรอื่นๆที่มีความเหมาะสมและปลอดภัยมากยิ่งขึ้นเพื่อขอใบรับรองมาตรฐาน GAP

6. การขาดความพร้อมในการตรวจสอบ GAP เป็นอุปสรรคสำคัญต่อการขอใบรับรองมาตรฐาน GAP

ข้อค้นพบที่นำไปสู่การพัฒนาสุขอนามัยของชุมชน เกิดจากการประชุมเชิงปฏิบัติการร่วมกับเกษตรกรภายใต้ศูนย์คำคุณ ซึ่งข้อค้นพบเหล่านี้คือ

7. เกษตรกรมีความเข้าใจไม่เพียงพอในกระบวนการตรวจรับรอง

8. การร่วมมือกับชุมชนเป็นสิ่งสำคัญในการบรรลุเป้าหมายร่วมกันและส่งเสริมการเปลี่ยนแปลงที่ยั่งยืน

นอกจากนี้ กลุ่มนิสิตได้แนะนำให้ใช้สื่อการเรียนรู้ที่ทางกลุ่มจัดทำขึ้น เพื่อสร้างรากฐานชุมชนนักปฏิบัติ (CoP) ในศูนย์คำคุณ และส่งเสริมสุขอนามัยของผู้คนในชุมชนอุบลรัตน์อย่างยั่งยืน

กลุ่มนิสิตหวังว่า ความร่วมมือระหว่างนิสิตและเกษตรกรภายใต้ศูนย์คำคุณในการปรับเปลี่ยนวิธีการปฏิบัติทางการเกษตรให้มีความปลอดภัย จะสามารถแก้ไขปัญหาที่ต้นเหตุและปกป้องเกษตรกรในท้องถิ่นให้ปราศจากโรคภัยต่างๆได้อย่างยั่งยืน

Authorship

Main Topics	Supporting Topics	Writers	Editors
Abstract		Theresa R.	Sophia I.
Acknowledgement		Napatsorn C. and Surangkana S.	Pakkarin P.
Executive Summary (in English)		Sophia M. and Theresa R.	Napatsorn C., Pakkarin P. and Surangkana S.
Executive Summary (in Thai)		Napatsorn C., Pakkarin P. and Surangkana S.	
Introduction		Sophia I.	Napatsorn C.
Background	Pesticide Use	Joelis and Theresa R.	Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.
	Around the World	Joelis, Sophia I., and Theresa R.	All
	In Thailand	Napatsorn C. and Yavitha S.	Pakkarin P., Sophia M., Sophia I. and Surangkana S.,
	Challenges to Pesticide Use	Pakkarin P.	Napatsorn C., Surangkana S. and Yavitha S.
	Organic Farming	Sophia I.	Napatsorn C., Pakkarin P., Sophia M., Surangkana S. and Yavitha S.
	Practices and Standards	Sophia I. and Joelis	Napatsorn C., Pakkarin P., Sophia M., Sophia I., Surangkana S. and Yavitha S.
	In Thailand	Sophia M. and Yavitha S.	Sophia I.

	Challenges to Organic Farming	Surangkana S. and Napatsorn C.	Joelis, Pakkarin P. and Yavitha S.
	Alternatives to Organic Farming	Theresa R.	Napatsorn C., Pakkarin P., Sophia M., Surangkana S. and Yavitha S.
	Good Agricultural Practices (GAP)	Pakkarin and Sophia M.	Napatsorn C., Sophia I., Surangkana S., and Yavitha S.
	Challenges to GAP	Yavitha S.	Napatsorn C., Pakkarin P. and Surangkana S.
	Farming in Northeast Thailand	Surangkana S.	Sophia I.
	Challenges to Farming in Northeast Thailand	Napatsorn C. and Surangkana S.	Pakkarin P. and Yavitha S.
Methodology	Analyze the current farming procedures within the Kham Koon Center farming plots and level of trust of consumers in the Ubonrat Hospital market.	Sophia M.	Joelis, Napatsorn C., Pakkarin P., Sophia I., Surangkana S. and Yavitha S.
	Collaborate with farmers to apply for GAP certification and find suitable methods to encourage the improvement of community health.	Sophia I.	Joelis, Napatsorn C., Pakkarin P., Sophia M., Surangkana S. and Yavitha S.
	Support and encourage the community in improving farming practices for the benefit of community health.	Theresa R.	All

Results and Analysis		All	Sophia I.
Conclusion and Recommendations		All	Sophia I., Sophia M. and Theresa R.
Appendix A - Sponsor Description		Sophia M. and Surangkana S.	Sophia I.
Appendix B - Initial Meeting with the founder of the Kham Koon Center, Dr. Tantip Thamrongvarangoon		Napatsorn C., Sophia I., and Surangkana S.	
Appendix C - Hospital Consumer Survey		Napatsorn C. and Yavitha S.	Pakkarin P.
Appendix D - Hospital Consumer Survey's Answer		Sophia I. and Theresa R.	
Appendix E - Farmer Observation Notes		Joelis, Sophia I., Sohia M. and Theresa R.	
Appendix F - Interview with Farmers under the Kham Koon Center		Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.	
Appendix G - Farmers Interview Answer		Pakkarin P., Surangkana S. and Yavitha S.	
Appendix H - KAP (Knowledge, Attitudes, and Practices) Survey		Napatsorn C., Sophia I. and Yavitha S.	
Appendix I - KAP Survey Results		Sophia M.	
Appendix J - Interview with operator of SAFETist Farm, Bangkok		Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.	
Appendix K - Interview with Representatives from World Vegetable Center		Sophia I	

Appendix L - World Vegetable Center Interview Coding		Sophia I	
Appendix J - Traceability Record Sheet		Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.	
Appendix N - Infographics Poster 1		Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.	
Appendix O - Infographic Poster 2		Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.	
Appendix P - Infographic Poster 3		Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.	
Appendix Q - Handbook Final Draft (Thai)		Napatsorn C., Pakkarin P., Surangkana S. and Yavitha S.	
Appendix R - Handbook Final Draft (English)		All	All

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Glossary/Abbreviation

Agroecological	A type of farming that prioritizes sustainability with the natural environment.
CoP	Community of Practice
Crop Rotation	Involves planting various crops in succession on the same field to enhance soil quality, optimize soil nutrients, and manage pests and weeds effectively.
DOA	Department of Agriculture
EU	European Union
Fallow Period	A stage of crop rotation whereby the land is deliberately not used to grow a crop
FDA	United States Food and Drug Administration
GAP	Good Agricultural Practices
IFOAM	International Federation of Organic Agriculture Movements
IPM	Integrated Pest Management
KAP	Knowledge, Attitude, and Practices
NGO	Non-Government Official
PAR	Participatory Action Research
PGS	Participatory Guarantee System
SCDF	Sustainable Community Development Foundation; Sponsor
WVC	World Vegetable Center

1. Introduction

In Thailand, the excessive use of pesticides has evolved into a major health issue. Caused in part by farmers trying to maximize their yields, there is now an increased presence of chemical fertilizers and insecticides in produce and the ambient environment (UNDP, 2007). The result of this is widespread and negatively impacts the welfare of entire farming communities. Although there have been efforts to improve agricultural practices and the health of the people living here, there are many obstacles that Thai farmers have to overcome. Most of these farmers lack the proper resources and guidance to improve upon the safety of their methods, even when they are interested in the betterment of community health (Olsen & Borit, 2018; Sangkumchaliang & Huang, 2012). The main approach that will allow Thailand to transition toward safer agriculture for improved public health is encouraging Thai farmers to adjust their practices.

Sustainable Community Development Foundation (SCDF) was founded by Dr. Apisit Thamrongvarangoon MD. and Dr. Tantip Thamrongvarangoon MD. to foster self-sufficiency within individuals and improve the well-being and happiness of the people in the community. One of their initiatives to tackle society's health issues in the Northeastern part of Thailand is the establishment of the Kham Koon Center which serves as an educational facility mainly for farming communities in the Ubonrat district, Khon Kaen (Sustainable Community Development Foundation Khon Kaen, n.d.). The importance of this issue is recognized not only by the Kham Koon Center but also by the Ubonrat Hospital. Hence, the two institutions have collaborated to work towards this common goal. Since farmers under the Kham Koon Center supply their produce to the Ubonrat Hospital stalls and kitchens, the qualification of their goods is crucial to the health of consumers. The institutes have identified several issues within the Ubonrat community, including misuse, overuse, and lack of knowledge about pesticides and chemicals.

One way in which Thailand has attempted to address its pesticide issue is by encouraging organic farming initiatives. In 1997, the Thai government conducted the Pilot Project on Sustainable Agriculture Development for small farmers (Pattanapant and Shivakoti 2009). The government has also developed organic crop standards and a certification body for organic products (Sangkumchaliang & Huang, 2012). Along with this, Thailand's Ministry of Agriculture and Cooperatives developed a peer-to-peer system for farmers to test and certify each other's produce, called the Participatory Guarantee System (PGS) (Bank, 2017). The PGS certification system was piloted at 15 sites around Thailand and has received \$14 million USD in funding.

Despite Thailand's many initiatives to influence farmers throughout the country to strive for organic certification, such as the EU and the USDA, this is still not feasible for all communities. In smaller rural areas, such as the ones in the Ubonrat community, the regulations associated with organic certification are often impractical and strict for farmers to comply with. The stringent standards often deter farmers from even attempting to apply for this type of certification, thus keeping them from improving their practices at all. Rather than immediately initiating the process of official organic certification and overestimating what is feasible for farmers, a different approach is required to better suit the needs of this small community. Consequently, our team identified that a lack of knowledge about how to improve farming practices for the sake of public health, rather than simply attempting to comply with strict organic standards, is at the core of the issue (Appendix B).

The overall goal of this project is to propose efficient and effective guidelines for the Kham Koon Center to educate and collaborate with local farmers to assist them in adopting Good Agricultural Practices (GAP) as part of an initiative to improve the health of the community. This will allow our team to identify the barriers that affect farming throughout Thailand, including the lack of education about GAP practices and the challenges in applying

for the GAP certification, as well as the dangers of pesticides.

First, the team analyzed the current farming procedures of the farms under the Kham Koon Center through interviews with farmers, documented observations, and a survey to investigate the consumers' perceptions of the food in the hospital market. Based on this, the team determined that GAP is a more suitable certification for the farmers and that consumer trust was not an issue in this tight-knit community. Through interviews with various experts including a farm in Bangkok, a GAP inspection official, and the World Vegetable Center, the team created infographics and a handbook about the GAP certification process and improved farming techniques. Then, the team applied the principles of the Participatory Action Research (PAR) method to conduct a collaborative workshop with participating farmers regarding the GAP certification process, farming practices, and traceability system. Overall, the team was able to assist the remaining ten farming plots in applying for GAP certification and collaboratively find the most suitable methods for improving the health of the community through agricultural practices.

2. Background

In order to properly address the issue of chemical misuse and barriers in improving farming practices that impact the health of the Ubonrat community, background knowledge of pesticide use and general farming standards and practices is essential. This chapter will first explore issues pertaining to pesticide use and misuse around the world and in Thailand specifically. Then, the team will discuss organic farming standards, why they are used, and the challenges of organic certification. Next, the team will elaborate on other relevant standards, which can be used as alternatives to organic certification, such as Good Agricultural Practices (GAP). The team will finish by explaining the importance of improving farming practices in Khon Kaen.

2.1) Pesticide Use

In farming, pesticides have become somewhat indispensable because they are used to manage weeds, insect infestations, and crop illnesses. Approximately one-third of agricultural production relies on the use of pesticides given that, without it, fruit production would drop by 78%, vegetable production by 54%, and grain production by 32% (Tudi et al., 2021). Nevertheless, problems arise when these chemicals are misused and not applied safely. Improper use leads to pollution and food contamination, and negatively affects human health, the environment, and the other living organisms in it (Tudi et al., 2021). The use of certain pesticides has serious, dangerous, and long-term health consequences for both humans and the environment. The health risks are greater in developing countries due to the lack of adequate Personal Protective Equipment (PPE). Along with this, even though labels on pesticides mention safety hazards and overuse, farmers do not always read the label instructions (Sakar et al., 2021). Even if the farmers do, it does not guarantee that they will follow them properly. Oftentimes, if farmers find that spraying pesticides produces higher

yields of vegetables and increases protection against crop loss, they will continue to overspray the chemicals, regardless of health advisories (see Appendix F). It is evident that the role of pesticides in agriculture poses a complex problem, being both a significant support as well as a threat to farmers and the general public.

2.1.1) Around the world

Worldwide, three billion kilograms of pesticides are used per year, yet only 1% out of all has been utilized successfully to control pests on target plants (Tudi et al., 2021). The remaining, substantial quantities of pesticides are still present in the environment and affect other non-target organisms. Pesticide pollution, as a result, has damaged the environment and has an adverse effect on human health. Several issues involving pesticide use and misuse that lead to overarching public health threats will be discussed in this section.

When taking advantage of the convenience of pesticides, it must also be considered how these chemicals impact not only the food but also the surrounding environment. Some issues that result from pesticide application are sorption, leaching, spray drift, volatilization, and surface runoff, all of which cause the movement of pesticides from their target area (Tudi et al., 2021). Sorption is caused by the attraction between the chemicals and the particles of the soil, leading to merging. When this occurs, a large portion of the applied pesticide sinks into the soil leading to soil pollution and making it less effective against plant disease. This in turn encourages farmers to apply even more pesticides to protect their crops. Another issue is leaching, which contaminates nearby water depending on the solubility of the chemical applied. Spray drift is the movement of spray droplets that are released from the treatment site, which coats the surrounding environment, also contributing to water pollution. In recent years, rising temperatures have resulted in volatilization, which is when pesticides vaporize and contaminate the atmosphere. Another challenge is that weeds are becoming more

resistant to pesticides over time, creating more competition for nutrients and water with crops when they are not properly managed (Pesticide Action Network, n.d.). As a result, the application rate of pesticides is anticipated to rise and will continue to contribute to environmental issues and deteriorating human health. Due to the increasing environmental presence of pesticides, there are major health risks: not only for the farmers spraying them but also for the whole community.

For the aforementioned reasons in regard to health and environmental risks, it is imperative that pesticide use is properly managed. Overspraying is typically due to farmers wanting to secure market profit and the logical fallacy that “more is better”, when, in reality, spraying more does not necessarily enhance their effectiveness (Yang M., Zhao X. and Meng, T., 2019). In a study done on farmers in the Shandong province of China, it was found that when farmers believe a loss of profit is due to cutting pesticides, they might resort to overuse. With the threat of such in mind, it can be affirmed that proper application ensures the health of the community and the environment.

2.1.2) In Thailand

Thailand is ranked third out of fifteen Asian countries in pesticide use per unit area (Sapbamrer, 2018). In 2016 alone, Thailand imported 67,445.87 tons of herbicides, 7,957.79 tons of fungicides, and 6,840.56 tons of insecticides, which is approximately 554.55 million USD (about 18.3 trillion Baht) worth of pesticides. Organophosphates, a class of synthetic poisons, are the most widely used across these categories. Spraying pesticides saves farmers time and labor, and an estimated 50% of crops are lost to pests in the field without crop protection strategies (Panuwet et al., 2012). With this in mind, the desire to take advantage of these chemicals is clear, though misuse and abuse can have serious health and environmental consequences. In 1992, Thailand established the National Hazardous Substance Committee

(NHSC) through the Hazardous Substances Act in an effort to combat the adverse effects of pesticide use and the importation of illegal pesticides, but their success has been very limited. Pesticides that consist of the same chemical compounds can be marketed under hundreds of different trade names, making it nearly impossible to monitor their sale. Further still, there is no way to continuously observe the practices employed by farms across the country.

Numerous studies have been conducted throughout Northern and Northeastern Thailand to determine how pesticide use has impacted the people living there. One study conducted in Chiang Mai Province found that more than 90% of the 124 participants, which includes the farmers and general citizens, had at least one indicator of organophosphates present in their urine, regardless of their occupations (Wongta et al., 2018). Another study in the same area focused on secondary school students and found that parental occupation and agricultural activities seemed to have little influence on pesticide exposure, indicating that dietary sources were contributing to the levels observed (Panuwet et al., 2009). Even in Khon Kaen, research conducted in 2010 found significant levels of pesticide residues in the water, soil, and ambient air, making it impossible to avoid their presence (Sapbamrer, 2018). The prevalence of locals testing positive for pesticide levels in their blood and urine directly correlates with an increased risk of illness. Acute clinical symptoms of exposure to high doses of organophosphates are similar to those of long term, chronic exposure, it can include respiratory insufficiency and illness, tremors, muscle weakness, paralysis, confusion, and neurologic dysfunction (Sapbamrer et al., 2014). This poses a clear threat to the health and safety of agricultural communities in Thailand, as well as anyone that consumes the products from these regions.

2.1.3) Challenges to Pesticide Use

The improper use of pesticides is the most significant challenge that farmers face since the farmers spray a large amount of pesticide on the crops, resulting in the loss of the

crop's immune systems. This is because they lack knowledge and understanding of pesticide usage, and think that the benefits of pesticides outweigh the drawbacks. Therefore, they continue spraying the pesticide all over again as they think that it may enhance the health of the plant, and prevent them from dying. Most importantly, the farmers are not aware of or follow the instructions on pesticides label properly. This leads to consequential problems such as human health and environmental issues.

2.2) Organic Farming

In response to this growing pesticide issue in Thailand and the government's desire to improve the health of the public, the demand for organic produce has increased in recent years (The World of Organic Agriculture, 2022, p. 317). Organic farming is an environmentally friendly farming system that produces food based on the principles of balancing ecosystems, preventing soil fertility decline, and holistic solutions to pest problems (Costa et al., 2019). The global shift toward organic farming is both pro-environment and pro-consumer, keeping undesirable chemicals out of the soil, waterways, and, most importantly, human bodies. Certified organic farming requires strict compliance with a variety of different standards and regulations that govern how to properly source soil, fertilizer, water, and seeds, along with methods for managing livestock and unwanted insects and weeds. These aspects must be closely monitored and controlled if a farm wants to be organically certified. In this section, the team will explore different practices and standards of organic farming, including how they are employed in Thailand and the related challenges.

2.2.1) Practices and Standards

Integrated Pest Management (IPM) is an organic practice which attempts to decrease the usage of pesticides on crops (CIRAD, 2022). Pesticides should be used sparingly, and integrated protection encourages the usage and rotation of various pest control methods to

prevent the formation of large pest populations. These methods include chemical, biological, physical, and crop-specific techniques (Food and Agriculture Organization of the United Nations, n.d.). According to the Food and Agriculture Organization of the United Nations, the fundamentals of IPM and their role in sustainable agriculture are the following: application of sustainable pesticides, reduction of pesticide residues, and the preservation of the crop balance in the ecosystem. Additionally, it encourages agricultural stewardship and broadens farmers' understanding of how their local ecosystems work. IPM emerged around the 60s and pesticide use still continues to increase, hence practices from crop protection based on agroecological principles might also be helpful.

Certification standards are largely dependent on where a given product is grown and where it is going to be sold. More than 90 countries worldwide have developed their own system of organic regulations (The World of Organic Agriculture, 2022). Farmers need to assess what standards are most advantageous for them to comply with depending on their location, target market, and available resources.

One important aspect of any organic certification is traceability, which can take on a variety of forms but must involve the record-keeping of products grown and sold. Traceability is defined as the ability to access any and all information relating to that which is under consideration, throughout its entire life cycle, by means of recorded identifications (Olsen & Borit, 2018). There are many different types of traceability systems, each with its own unique advantages and disadvantages based on the level of difficulty to access the information, and the amount of information available. These systems are used all over the world and are a crucial part of food safety, for not only does it provide consumers with information on the origins of their food, but it also allows for the recall of food items if there is an outbreak of illness. Effective traceability systems make it possible to identify, single out, and remove unsafe food products from the market (Liao et al., 2011).

Recently, increasing requirements for traceability have been put in place in an effort to improve food safety. Examples of global requirements include the European Union (EU): General Good Law and the United States FDA Food Safety Modernization Act (Olsen & Borit, 2018). The Taiwanese government has also proposed its “Five rings of food safety” (Shu-Chen et al., 2022), after several disease-related food incidents. Food traceability systems are critical in addressing disease risks associated with microbial contamination of fresh produce because they provide a method of tracing the origins of food and recalling food if necessary, ultimately ensuring the health of the customers (Parker et al., 2012).

Traceability systems can additionally be used by farmers to help in planning their plots and inspections. The diverse nature of production strategies used by farmers across the world makes it difficult to pinpoint a single implementation strategy to standardize a traceability system (Parker et al., 2012). Despite its difficulties, it is still necessary for farmers who are planning to obtain any type of organic certification. From simply keeping records with a pen and paper, to creating a fully digitized system and using scannable QR codes, some method of crop tracing is imperative for farmers looking to become certified.

In addition to a traceability system, becoming organically certified also requires compliance with standards relating to every aspect of farming, including the sources of seeds and water, soil maintenance, types of fertilizers, weeding methods, and pest management methods.

2.2.2) In Thailand

As Thailand considers improving its agricultural sectors to provide better livelihoods for farmers and create more opportunities for businesses, organic food plays a main role in achieving these objectives. The main foods grown organically in Thailand are rice, coffee

beans, mulberry leaf tea, fresh vegetables such as lettuce, and fruits such as coconut (Thai Organic Foods Have Healthy Growth Potential, 2017).

Primary pricing is a strong incentive for organic producers. Consumers are willing to pay between 15% to 50% more for organic products than conventional foods. This stands in sharp contrast to the sinking prices of many of Thailand's commodities, such as corn, tapioca, and soybeans. The price of the most important crops nationally, such as rice, has also fallen, and 60% of farmers are currently suffering due to lower incomes. Chemical-free agriculture sidesteps the challenging price volatility of crops traded in global markets, yet organic farming remains a niche industry in Thailand. According to Organic Agriculture Development Thailand and the Earth Net Foundation, just 0.3 % of the country's agricultural land is certified as organic, compared with 1% worldwide (Bangkok Post - The World's Window on Thailand | Breaking News, Thailand News, Latest News, World News, 2022).

A popular approach for those seeking to join the few organically certified farms in Thailand is the implementation of a Participatory Guarantee System (PGS), which utilizes the ideals of organic farming to set standards for the community it governs. As a technique of verification for organic produce, it is adaptable to fit many cultures and lifestyles. For example, in Vietnam, the system is applied using two standards, the first being Vietnam PGS Organic Standards issued by the International Federation of Organic Agriculture Movements (IFOAM) in 2013, and the second being BasicGAP (Rikolto, 2014). The system is based on farmers, consumers, rural advisers, and local authorities working together to make decisions, visit farms, help one another, and ensure that farmers produce according to an organic standard. This leads to a community built on the basis of trust, social networks, and information sharing among all of the stakeholders. Hence, PGS is a more ideal method for small-scale farmers in developing markets, where organic commodities are just introduced or are about to expand (What is Participatory Guarantee System (PGS)?, n.d.).

2.2.3) Challenges to Organic Farming

An unfortunate consequence of rigid standards is that they can make the organic market less accessible to farms that are unable to implement the latest organic farming technologies (Barrett, 2012). Small farms undeniably must overcome more accessibility barriers than large farming corporations when it comes to organic certification (Research Institute of Organic Agriculture FiBL IFOAM, 2017). Resources imperative to organic production, such as additional labor and extra equipment, come with an added cost, which is a large obstacle for many farmers. Without chemicals, organic farms need to recruit more workers to handle supplemental tasks such as manual weeding, water cleanup, and pesticide management (Abebe et al., 2022). At the same time, their overall yield decreases without the protection pesticides provide, supporting the argument that organic farming is less efficient in developing countries. Since there are more labor inputs per unit of output for organic farming, it is evident that the production of organic food is often more expensive. Although beneficial for the community, the cost of producing organic crops poses a difficult challenge.

2.3) Alternatives to Organic Farming

Due to the strict nature of certification standards, organic farming is not feasible on a universal scale (Abebe et al., 2022). Farmers are often reluctant to transition to organic agriculture standards due to the requirements they need to fulfill. However, this does not mean that agriculture that is safe for farmers, consumers, and the environment, which is the core philosophy of organic farming cannot be applied using other methods. Absolute compliance may be required for official certification, but techniques can be lifted from organic farming methodology and utilized without the need for certification.

2.3.1) Good Agricultural Practices (GAP)

One alternative method to improve farming practices in rural areas and the health of communities is the Good Agricultural Practices (GAP) standards. GAP is a set of guidelines and recommendations for farmers to follow in order to produce sustainable, safe, and high-quality food products while minimizing the environmental impact of farming operations (Good Agricultural Practices - General Guide, 1969). GAP guidelines are established by government bodies or industry organizations and can vary depending on the type of crops or the region. GAP includes practices such as proper use of fertilizers and pesticides, conservation of water resources, adequate worker training, usage of protective equipment, proper post-harvest handling, storage, and food safety practices intended to prevent the occurrence of foodborne illness.

GAP can be implemented as a multiple step process that requires a commitment to ongoing assessment, planning, and monitoring. The first step in implementing GAP is to familiarize oneself with the guidelines and to understand the importance of food safety, quality, and the protection of the environment (Good Agricultural Practices - General Guide, 1969). This involves researching GAP and reading through the guidelines provided by relevant organizations. Next, farmers should conduct an assessment of their current farming practices and identify areas for improvement. This involves evaluating soil and water management, pest control, and worker safety practices. The major principle of GAP is the proper use of fertilizers and pesticides. This includes using approved chemicals, applying them at a suitable rate and time, and using measures to prevent contamination of water sources. Proper soil management helps to maintain soil health and fertility which lead to higher crop yields. Managing water resources includes ensuring that irrigation systems are properly designed and maintained, and that water is used efficiently and sustainably. This can help to conserve water resources and reduce the risk of contamination. By identifying

potential risks or hazards, farmers can prioritize which areas to focus on first (National Bureau of Agricultural Commodity and Food Standards, 2003).

To ensure that GAP is being properly followed, farmers should establish a traceability system for monitoring and documenting their practices (Good Agricultural Practices - General Guide, 1969). This includes keeping records of when and how chemicals are applied, monitoring soil and water quality, and conducting regular safety inspections of equipment and facilities. The recorded data can help the farmer to evaluate the effectiveness of the implemented plan and identify areas of improvement. Finally, farmers require to implement good post-harvest handling, storage, and transportation to preserve the quality and safety of the products for traceability to ensure that the products remain safe for consumption (Izquierdo, J., Fazzone, M., & Duran, M. et al., 2007).

It is important to note that GAP guidelines and certified organic standards are two different approaches to farming that have different goals and methods. As mentioned, GAP is a set of recommendations that farmers can choose to follow in order to produce safer crops. On the other hand, organic farming involves a specific set of rules that are certified by an independent organization (Organic Farming Practices, n.d.). One of the main differences between GAP and organic farming is the use of chemicals. GAP does not prohibit the use of chemicals, but proper usage guidelines must be followed so that it is not harmful to consumers and does not remain in the environment (Good Agricultural Practices - General Guide, 1969). Conversely, Organic farming prohibits the use of synthetic chemicals, pesticides, and genetically modified organisms (Bank, 2017). Certified organic farmers use natural methods such as crop rotation, companion planting, and biological pest control to manage pests and diseases. In terms of animal welfare, GAP provides guidelines for the humane treatment of animals, but organic farming requires animals to be raised in natural conditions and without the use of hormones or antibiotics. GAP regulations are less strict and

allow small, rural farmers the freedom to improve their farming practices without having to drastically and unrealistically comply with rules that are not applicable.

2.3.2) Challenges to GAP

One of the challenges to GAP is the proper use of fertilizers and pesticides. To follow the regulations, the farmers are required to adjust their current farming practices, such as switching to more sustainable irrigation methods, implementing Integrated Pest Management (IPM) methods, or applying more effective fertilization methods. Furthermore, it may also involve investing in new equipment, training workers to ensure that they are knowledgeable in farming practices, applying the proper use of pesticides, and following other essential GAP guidelines. Besides, obtaining GAP requires the implementation of a traceability system in which the farmers need to keep records of activities occurring on the farm, yet the farmers still are not aware of the importance of the traceability systems (Good Agricultural Practices - General Guide, 1969).

2.4) Farming in Northeastern Thailand

Considered to be the poorest region of Thailand, the population of Northeastern Thailand consists of more than 80% rural farm families living at the subsistence level (Hussain, & Doane, 1995, p. 45). The Northeastern region has been afflicted by increasing frequency of extreme weather conditions, such as flooding and drought seasons, necessitating farmers to devote great effort to continuously adjusting their farming practices. These environmental and socio-economic factors have resulted not only in a lack of farm investment and land improvement but also in the shortening of the fallow period, decreasing from the traditional ten to fifteen-year range to only three or four. This is not enough time to replenish the soil nutrient levels required to sustain agriculture. The falling yields lead to a

cycle of reduced fallow and further degradation of the farmlands, ultimately causing many formerly cultivated areas to be abandoned altogether. These aforementioned factors make the Northeastern region difficult to farm in and impact the crops that are able to be grown on the farms in the Ubonrat district.

These factors create the need for change in the farming sector, this is where our sponsor The Sustainable Community Development Foundation (SCDF) comes into play. It was founded by two doctors working at the Ubonrat Hospital in 1995, establishing their partnership. The two organizations follow the same “H2S5” values, which outline five major values of the hospital and the SCDF and include ideas regarding acting with humility and sustainability (see Appendix A). Kham Koon Center is a nonprofit organization located in Ubonrat, Khon Kaen. It was established under the SCDF to develop self-sustainability and improve the overall health of the community. They currently offer many products at their market, including rice, chicken and duck eggs, fish, and seasonal vegetables, including Thai eggplant, bird chili, lime, spring onion, lemongrass, galangal, pumpkin, cucumber, long bean, kale, water convolvulus, and Chinese kale (see Appendix D). They have also been able to sell to some local markets in Khon Kaen province and have a program customers can subscribe to in which they are sent weekly produce baskets (see Appendix A).

2.4.1) Challenges to farming in Northeastern Thailand

Despite the support and attempts in improving agriculture in the Northeastern part of Thailand, there are still many challenges that impact farmers in the area. The first is the shortage of water due to the insignificant amount of irrigation systems and extreme weather conditions. In fact, only 11% of the plantation fields in Northeastern Thailand have an irrigation system in contrast to North and Central Thailand with 33.94% and 44.99% respectively (Srisompun, 2020). As a consequence, farmers depend on rain for water which is

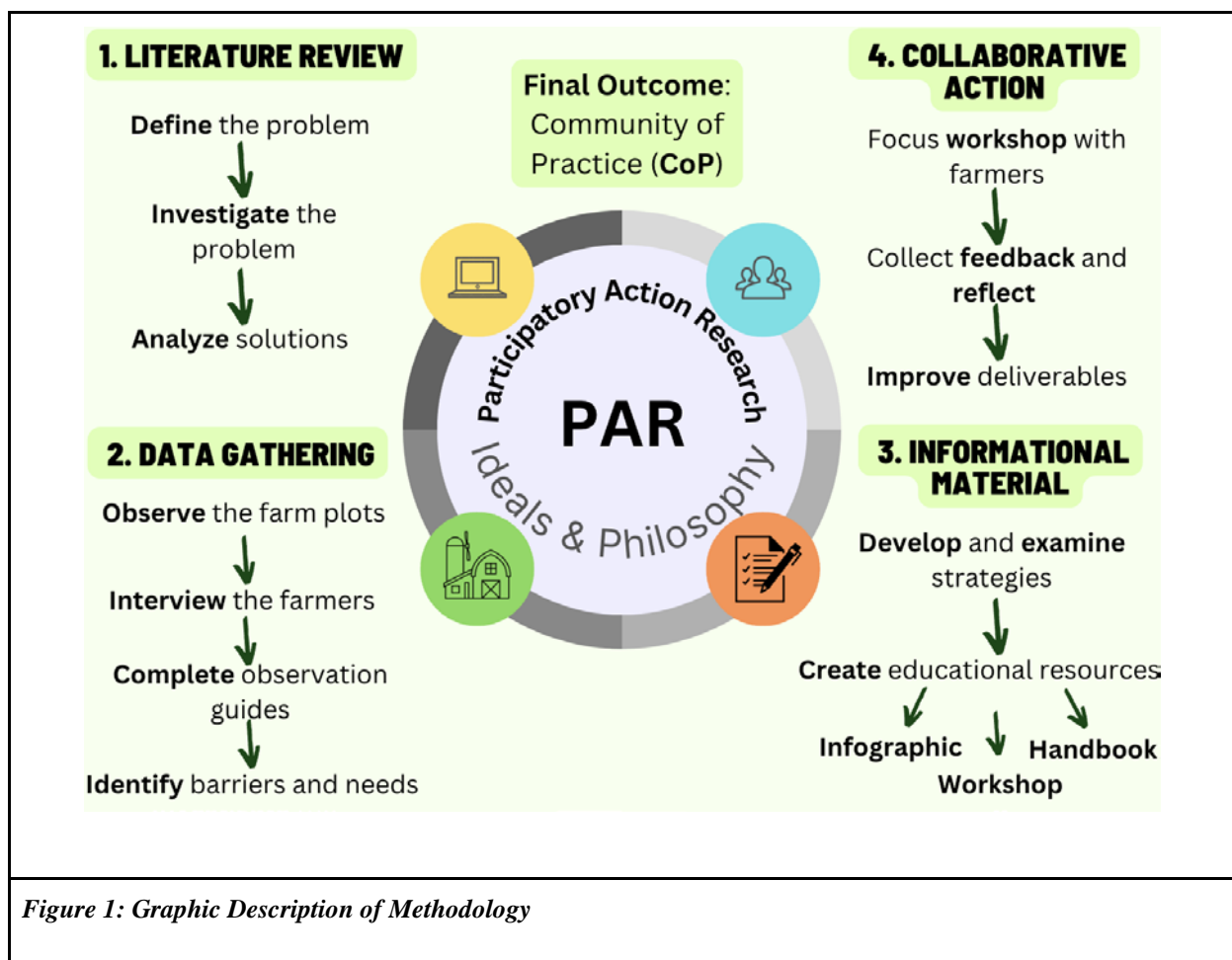
a problem as the weather in Northeastern Thailand is unpredictable because of climate change (Udomkerdmongkol, 2020). When not suffering from drought, farmers experienced floods damaging their fields, lowering crop production as a result. In addition, poverty and debt also pose significant challenges within the agricultural sector. A considerable 40% of farming households earn an annual income below the poverty line of 32,000 baht, while 30% have debt levels exceeding their average annual farming income per person (Udomkerdmonkol, 2020). Farmers are reluctant to change their mindset towards farming practices despite these challenges, making it difficult for them to invest in farm improvement.

2.5) Summary

Pesticides and the misuse of chemicals are clearly a prevalent issue, not only around the world but especially in Thailand. Although organic farming is a feasible solution to this issue for some areas, it is not always the best solution for rural farming communities in which strict regulations are not realistic. Organic regulations require that every single step of the farming process, including the source of seeds, water, and pest management methods, be completely organic. This poses a number of challenges, the main one being the increased cost and decreased yield. In addition, the stringent regulations of the official organic certification make some farmers reluctant to attempt to obtain it (Abebe et al., 2022). As with many rural farming communities in Thailand, the GAP certification proves to be more realistic and feasible for the Kham Koon Center in Northeast Thailand, where the main issue revolves around community health, rather than the organic label itself.

3. Methodology

To propose efficient and effective guidelines for the Kham Koon Center, the team collaborated with local farmers and assisted them in adopting Good Agricultural Practices (GAP) as part of an initiative to improve the health of the community. The team was able to address the issues that affect communities throughout Thailand, including the lack of knowledge about the GAP certification process and the dangers of pesticides to people's health. Figure 1, gives a graphic depiction of the technique utilized.



The following methodologies were applied:

1. Understand the current farming procedures used by farmers under Kham Koon Center and the level of trust of consumers purchasing produce at the Ubonrat Hospital stalls.

2. Gain a better understanding of the GAP certification process and methods for improved farming practices.
3. Collaborate and support farmers under Kham Koon Center in finding and implementing suitable methods for safer farming practices.

In this chapter, the team will describe, explain, and justify the methods we used to achieve these objectives.

3.1) Understand the current farming procedures used by farmers under Kham Koon Center and the level of trust of consumers purchasing produce at the Ubonrat Hospital stalls

To initiate this process, a complete understanding of qualifications and the implementation of Thai organic standards was necessary. The team conducted interviews, surveys, and direct observation to achieve this method.

The team met with one of the founders of SCDF, Dr. Tantip Thamrongvarangoon, to learn more about the Kham Koon Center's mission, working procedures, and partnership with the hospital. This meeting played an important part in formulating questions for the interviews with the farmers along with a guide for creating observation notes as well as the construction of the questionnaire for the consumers.



Figure 2: Meeting with the founder of SCDF, Dr. Tantip Thamrongvarangoon

After gathering information, the team interviewed ten farmers and conducted on-site observations of their plots. The team assessed one certified and nine uncertified farmers to identify disparities and areas of improvement for the uncertified farms. Instead of using formal communication, the team decided to communicate with farmers in a friendly and approachable manner to establish a connection and trust between the team and the participating farmers. This ensured that they would be more willing to answer our questions accurately. The purpose of the interview was to understand the farmers' resources and the feasibility of implementing new procedures to make their farming methods safer (see Appendix F). To gain a better understanding of the farmers' practices and perceptions, the team conducted interviews that focused on topics including their use of pesticides, and their attitudes toward organic farming in order to explore the main obstacles they encountered in obtaining certification. By conducting the in-person interviews, the team employed body language and tone of voice to gain insight into the overall attitudes and perceptions towards the certification. To ensure accurate documentation of the interviews, a voice recording application was utilized and all recorded interviews were subsequently uploaded to Google Drive Folder.



Figure 3: Meeting with Uncertified Farmer 7 at their plots for an interview



Inductive coding, specifically thematic analysis, was used to analyze the interviews. Inductive coding involves a bottom-up approach in which the user can develop codes as the data is analyzed (Deductive and Inductive Approaches to Coding, n.d.). The team determined that thematic analysis was the most appropriate method of inductive research to apply to our findings. This method involves reading through a data set and identifying patterns across the data to derive themes (How to Do Thematic Analysis, n.d.). Through the process of reviewing the interview answers, the team noted common patterns within the answers and attitudes of the farmers. The team established four themes, which included barriers to certification, attitudes toward organic/improved practices, practices that violate organic standards, and practices that comply with organic standards. Then, the team scrutinized for repetition among the interview answers and categorized common phrases into one of the four different themes. Finally, the team recorded how many times each of these chosen phrases were mentioned, and calculated how often it appeared within its assigned theme. This method of analysis was selected because it allowed us to evaluate the most popular attitudes toward organic farming and related practices.

During farm visits, the team conducted direct observations, documenting farm conditions through photos and videos and completing observation notes for each farm. The notes included details such as farming practices, livestock, water sources, sanitation, and general conditions (see Appendix E), which were organized in a Google Drive Folder. The team chose to create an observation note because this allowed us to list the requirements of becoming an organically certified farm beforehand and took notes about whether the observed farms met these regulations, or had the resources to meet these requirements in the future. The team found these methods suitable for assessing farm conditions and identifying possibilities for the future.

After our basic understanding of the farms was established, the team needed to determine the feasibility of implementing several practices related to GAP and understand the farmers' willingness or interest to do so. The team analyzed the farmers' Knowledge, Attitudes, and Practices (KAP) about organic foods and GAP certification through the survey (Appendix G); A KAP survey is a research tool designed to assess the knowledge, attitudes, and practices of a group of people with respect to a specific topic or issue. It involves a structured questionnaire that gathers quantitative and qualitative data, which can be analyzed to identify patterns, trends, and potential barriers to achieving desired outcomes (The KAP Survey Model (Knowledge, Attitudes, and Practices), 2014).

Employing these fundamentals, the KAP survey questions asked the farmers about their understanding and attitude toward GAP certification processes as well as their current farming practices, mainly pertaining to the topic of pesticide use. The survey was conducted among seventeen farmers, comprising ten previously visited by the team and seven additional farmers. The inclusion of the latter group was intended to gather additional information on their farming practices. As the farmers were completing the physical copies of the survey, the team recited each question to ensure that they clearly understood the questions. The team

compiled this data into pie charts due to its simplicity to display the general distribution of the answers (Appendix H). The survey answers were analyzed to find the general trends and gaps in the farmers' knowledge, as well as identify any challenges in obtaining certification.

In addition, another survey was conducted with the consumers at Ubonrat Hospital stalls since this is the main location that the farmers sell to.



Figure 5: Survey Location: Ubonrat Hospital stalls

This survey included questions about how often the hospital's consumers buy organic products, how much they are willing to spend on organic foods, what kind of marketing entices them when shopping for groceries, their level of general knowledge about organic farming, and the type of organic products that most people are looking for and willing to buy (Appendix C). The survey was crucial to identify the perceptions of organic products among the consumers, as well as the level of trust between the consumers and farmers.

Rather than electronic-based, a paper-based survey was chosen as it can reduce the steps taken to access and can reach as many participants as possible in a short period of time. The paper survey was able to reach forty-five consumers at the Ubonrat hospital stalls with support from the staff at Ubonrat hospital. Before giving out the surveys, the team notified

the customers of informed consent, and if there were any inconveniences, they could abstain from answering any questions. Participant's personal information was not collected, with the exception of age and gender, which were relevant demographic data for analysis purposes.

The data collected from the interviews with farmers and direct observations at their farms provided the team with a better understanding of the conditions of each of the ten farm plots, and the feasibility of organic certification within Kham Koon Center. The surveys also provided insight into the attitudes and perceptions of the farmers and consumers toward organic foods.

3.2) Gain a better understanding of the GAP certification process and methods for improved farming practices.

In order to secure a more in-depth knowledge of the GAP certification process and additional methods for improved farming practices, the team interviewed Mr. Thawatchai Sirasang, the operator of the SAFETist Farm, located in Bangkok (Appendix J). This farm is currently trying to get PGS certification, which is what the Kham Koon Center wants to strive for in the future.



Figure 6: Interview with Mr. Thawatchai Sirasang, the operator of the SAFETist Farm

The interview allowed the team to understand not just the requirements, but also obtain advice for farmers initiating similar procedures from a person who is in the middle of an organic certification process. Some topics of the interview included the PGS certification process, specific practices the farm complies with, and challenges in obtaining the certificate (Appendix J). The team also used direct observation and documented the visit through photos and videos, similar to the process used on the farm under Kham Koon Center. The interview was recorded and put into a shared Google Drive Folder. Subsequently, the team utilized reflective listening techniques by reviewing recordings and paraphrasing the content to gain a deeper understanding of their thoughts and perspective (*Summary of Interview Techniques*, n.d.). This approach allowed the team to contemplate more effectively on the farmer's words and ensure that there was clear communication between the interviewer and interviewee.

Along with the SAFETist Farm interview, the team also interviewed two experts from the World Vegetable Center (WVC), which is an organization that promotes healthier lives and more resilient livelihoods through greater food diversity (Appendix K). The interviewees were Ms. Somchit Pruangwitayakun, a vegetable research and training officer, and Ms. Sopana Yule, an entomologist. Since the WVC has headquarters in Bangkok, as well as Northern Thailand, the team believed that they can provide helpful information, specifically pertaining to Thailand. For example, pest management tools that could be alternatives for pesticide use, and sustainable farming techniques that may be applied to the farms under Kham Koon Center. The team also asked for advice and tips on collaborating with farmers, as the vegetable center often conducts training to educate farmers on the application of farming techniques. After conducting the interview on Zoom, the team both recorded the conversation and noted down relevant and important information. Following the interview, the team reviewed the recording again to make sure that all the information given by the interviewee was collected. The information was analyzed through inductive, thematic coding and found

four common themes. These themes were color coded and organized into a table for better understanding (Appendix G).

Finally, the team interviewed GAP inspection officials, Mr. Anat Nundee and Ms. Chuleekorn Leenonlan, from the Department of Agriculture (DOA) in Khon Kaen. The goal of the DOA is to promote sustainable agricultural practices that balance the needs of farmers, the environment, and the economy. By focusing on crop research and development, the Department of Agriculture aims to increase agricultural productivity, improve the quality of crops, and reduce the labor required to produce them. At the same time, the department is committed to preserving natural resources and protecting the environment, which is essential for long-term sustainability. By adhering to international standards and the principles of natural resource conservation and environmental protection, the department of agriculture can ensure that its policies and programs are effective and efficient and that they have a positive impact on the lives of farmers and rural communities.

They provide a wide range of services to support farmers, agricultural producers, and the wider agricultural industry. This can include analyzing soil, water, fertilizers, crops, and other agricultural inputs to ensure their quality and safety, as well as providing inspection and quality certification services to ensure that products meet the standards required for the export or for sale in the local market. The department also offers advice on a range of areas of concern, such as export promotion, soil fertility management, water use, and best practices for growing different crops. By providing these services, the department of agriculture hopes that it would help to support the growth and development of the agricultural sector and to ensure that it operates effectively and efficiently, which benefits farmers, rural communities, and the economy as a whole.

Since the GAP inspection officials have first-hand experience in assessing and monitoring compliance of farms with GAP standards in Ubonrat, Khon Kaen, the team was

able to acquire useful information including the specific standards and required documents for applying for the GAP certificate, common challenges that the farmers faced during the inspection as well as the preparation for inspection and traceability record sheet. The interview was conducted on the phone because the team could not meet the official in person.

In conjunction with the various research the team has conducted about GAP standards, the team interviewed experts in each field to understand the certification process better and determine how to certify the remaining farms under Kham Koon Center.

3.3) Collaborate and support farmers under Kham Koon Center in applying for GAP certification and using healthier farming practices.

Dr. Tantip Thamrongvarangoon worked with the team to host a collaborative workshop with seventeen farmers from the Kham Koon Center comprising those who had taken the KAP survey previously. The ideals of Participatory Action Research (PAR) aligned with the goal of developing resources for the farmers to cover knowledge gaps and collaborating with the community to improve their situation. PAR is a research method that is often used in social science projects because the people involved in the study are experts on the research topic and their knowledge can be used to determine the best solution to a problem in their community (McIntyre, 2007). This applied to the farmers under the Kham Koon Center because they understand their own resources, abilities, and limitations in becoming GAP certified. This method was used as a form of communication and qualitative data gathering between the team and the farmers during a planned workshop.



Figure 7: Workshop with farmers under the Kham Koon Center

During the workshop, the team aided the farmers in applying for GAP certification by presenting the steps required for the application and guiding the participating farmers in filling out the application form. In addition, the team also constructed and prepared a traceability record sheet (Appendix M) beforehand which was approved by the GAP Inspection Official, Non-Government Official (NGO), and certified farmers. The sheet contains all the agricultural practices such as weeding, cleaning, watering, fertilizer, and disease and pest management for the farmers to keep proper records of what they are growing and their activities on the farms. The team also considered the farmers' accessibility and created an easy-filling form to be handed out to the farmers at the workshop. The farmers were informed about the importance of a traceability record sheet which is one of the requirements for the GAP inspection. In addition to this, the team created examples of sheets that were easy for farmers to follow and understand. In the workshop activity, the team aimed to provide guidelines and illustrate an example of traceability sheets on each crop. To get an effective outcome, the team researched and asked the farmers about the agricultural practices of each crop such as how long each crop grows, how much to water the crop, when to fertilize and weed the crop, and any other relevant activities

The team also created three infographic posters to express the importance of better farming practices and GAP. The first infographic is about "GAP Farming Practices"

(Appendix N). The second infographic is “What is GAP” (Appendix O), and the third infographic is about “The Benefits of GAP” (Appendix P).

The team decided to create infographics with visuals and easy wording since they are useful in conveying general themes and small pieces of information that are easily consumable and engaging for the public. The team printed copies of these infographics, showed them to the seventeen farmers during the collaborative workshop, and worked with attendees to gain feedback. The team asked for feedback and suggestions on the effectiveness of the infographics, the level of engagement, and overall opinions before revising the infographics according to the feedback. Throughout the process, the team asked the farmers if this was the best method for learning and preparing, and if they understood the requirements. This collaboration and discussion aided the team in better fitting the farmers’ needs. The team also discussed with the farmers about the best methods for accountability. When our team suggested creating a group in the LINE application for the farmers to be reminded and notified about the inspection date, and for them to store photos of their products for traceability, they agreed this is a suitable method for accountability.

From the aforementioned data gathering in Objective 2, the team also created a handbook to be printed and given to the farmers as an easy guide to obtaining certifications, as well as safer farming techniques (Appendix Q & R). The guide includes information about both GAP and PGS standards along with the steps and requirements for each application. Information on PGS standards was included as a stepping stone toward organic certification in the future. The handbook also has recommendations gathered from our literature review and various interviews including those with farmers under the Kham Koon Center. These recommendations were detailed information about weeding and soil preparation, methods for pest management, how and when to spray chemicals properly, and any other information that the team found to be useful throughout the research process. It will serve as a resource for the

farmers under the Kham Koon Center who want to convert their plots to have better practices, providing safer and healthier products for the community. After showing the farmers the printed infographics, the team also printed the first draft of the handbook and gave it to the farmers for feedback. The feedbacks were obtained by asking them similar discussion questions about the level of engagement of the handbook, the general appearance, and how useful the information inside was. After this productive discussion, the team used helpful feedbacks from the farmers to revise the handbook and better fit the farmers' needs.

After editing the infographics, the team printed out the final drafts of the posters and hung them on the front door of the Kham Koon Center, which was decided together with Dr. Tantip Thamrongvarangoon, given that it's a regularly visited place where meetings, sales, and visits take place. The team also gave the final handbook to Dr. Tantip Thamrongvarangoon to distribute to future farmers and those who need more information on safe farming practices. This enables us to reach and educate a larger audience than the team would otherwise be capable of accomplishing.



Figure 8: Dr. Tantip Thamrongvarangoon receives the handbook made by the team



Figure 9: Dr. Tantip Thamrongwarangoon shows the location for displaying the infographics

3.4) Summary

These objectives guided the course of our project and the work the team conducted in collaboration with the project sponsor. The team visited one of the founders of SCDF, Dr. Tantip Thamrongvarangoon, and farmers under the Kham Koon Center in Khon Kaen twice. During the first visit, the team conducted interviews and a survey with the farmers, a survey with the consumers of the hospital market, and documented the trip through pictures, videos, and observation notes. During the second visit, the team found locations to display our infographic posters around the Hospital and the Center, presented and discussed the infographics and handbook with the farmers and Dr. Tantip Thamrongvarangoon through a PAR-led workshop session, and helped the farmers apply for the GAP certification by advising them about traceability and creating a system for accountability. The team also presented the farmers with a certificate of participation in our workshop to recognize their participation and empower them to continue employing GAP.

Our developed action plan was performed as a whole and a small step built all of our methodologies. This contributed toward our goal of finding effective and efficient procedures for the farmers to apply for the GAP certification, as well as educating the community more about the importance of Good Agricultural Practices for a healthier life.

4. Results and Analysis

The farmers under the Kham Koon Center are the key to the foundational core of this project. Their input was essential in formulating the most beneficial solution. To more deeply assess the farmers' current practices and identify any gaps in knowledge, the team engaged in open dialogue with one of the founders of SCDF, Dr. Tantip Thamrongvarangoon, surveys and interviews with the farmers were conducted, as well as a survey to the consumers of the Ubonrat Hospital stalls. Following this, the team interviewed the SAFEtist farm, which is looking to become organically certified, two representatives from the World Vegetable Center, and a GAP inspection official. To present the materials, which included infographics such as posters and a handbook, and a traceability record sheet to the farmers to receive feedback, a workshop was held. The outcomes of such provided further insight into the inner workings of the community and allowed us to further develop our educational materials. In this chapter, the results and analysis of the aforementioned events will be discussed.

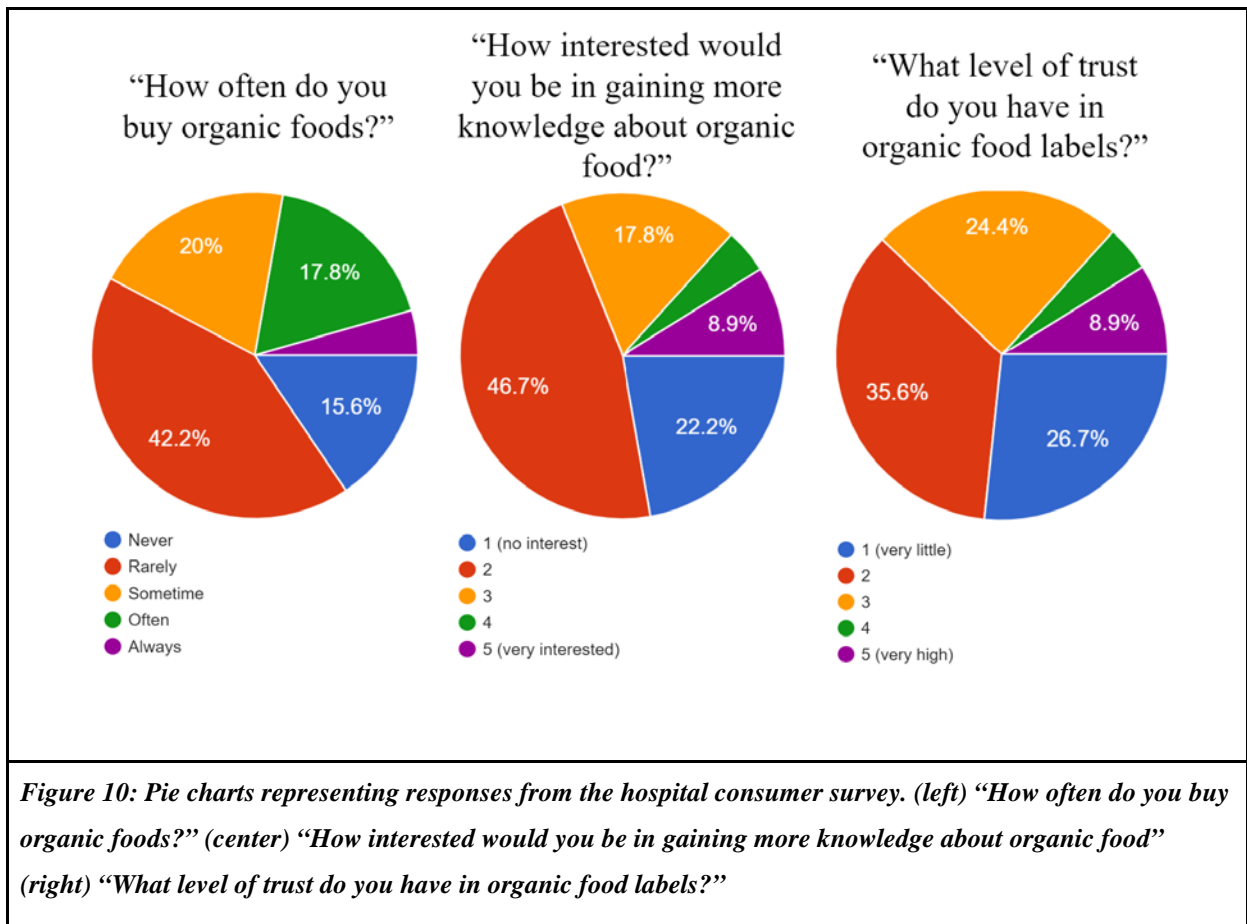
4.1) Analytical Insight 1: Shift in focus from organic certification to GAP certification.

After the team's first visit to the farms under Kham Koon Center, the team gained a wide range of information which demonstrated that international organic certification is neither feasible nor necessary for this small community of farms. The four findings below provided the team with the necessary data to draw the overarching analytical insight that GAP is a better fit for this community than full organic certification, which allowed our team to shift our focus and further our research.

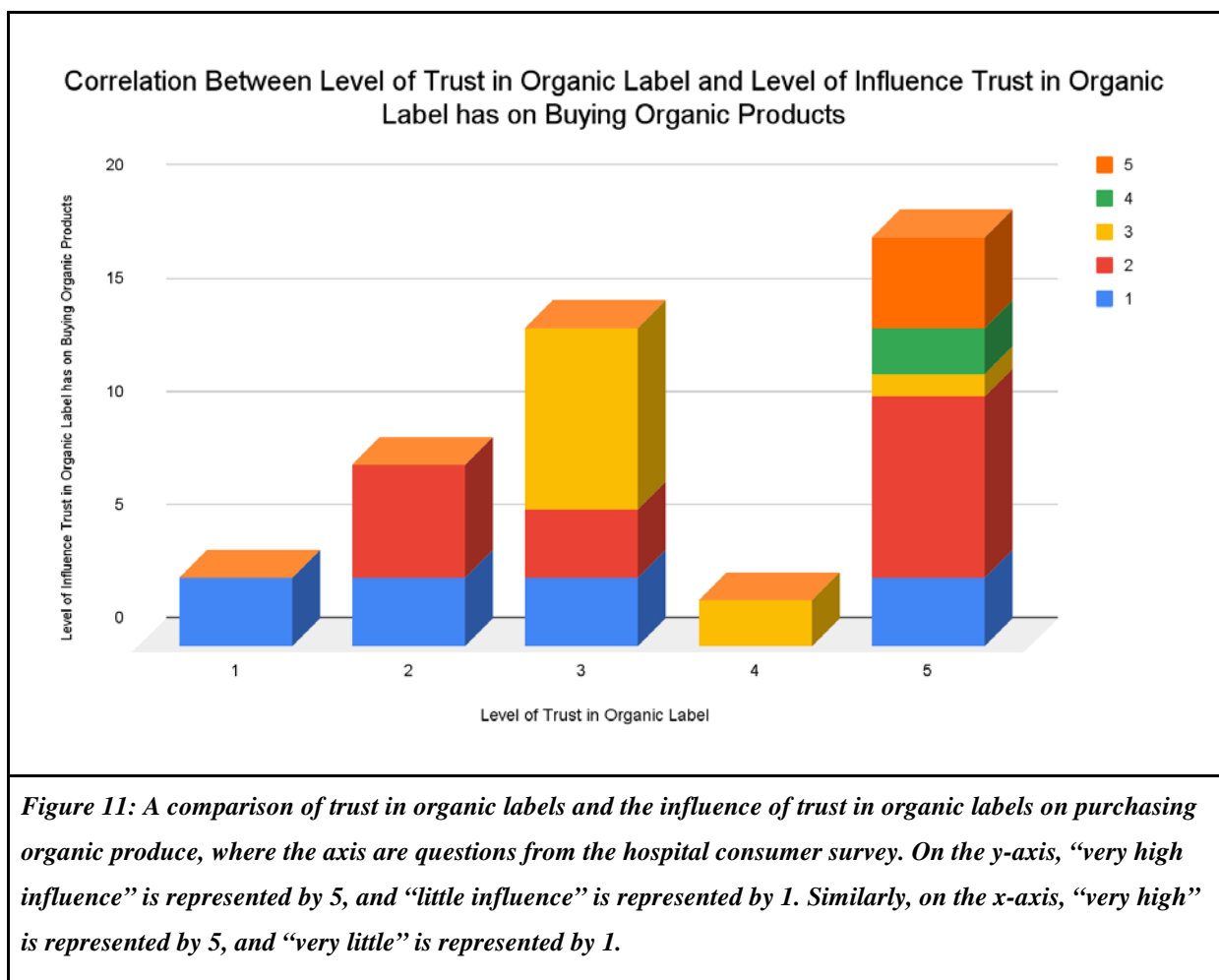
4.1.1) Finding 1: There is already sufficient consumer trust in this community.

During the initial visit to the Kham Koon Center, the team had a meeting with one of the founders of SCDF and discovered that the Ubonrat Hospital's mission is to improve the health of the community and eliminate threats to the well-being of the public at their origins. This was different from our original understanding of the sponsor's goal, which the team thought was to attain complete organic certification based on the Thailand Ministry of Agriculture standards, or some other official standard. One goal that the team thought would be essential to the project early on was increasing consumer trust through means of an organic label. During the discussion with Dr. Tantip Thamrongvarangoon, the team discovered that consumer trust already exists in the tight-knit community and that organic produce does not sell at a higher price when compared to non-organic goods. The team also learned that the food that farmers under the Kham Koon Center produce will never be sold on a national scale; rather, they sell locally, mainly to the Hospital and other individuals in the community. After conversations with the founder of SCDF and the consumer survey, the team diverges the objective of the project due to the fact that increasing consumer trust and helping farmers by selling organic produce at a higher price are not the priorities.

Part of understanding how the organic food market operates in Khon Kaen is becoming familiarized with the perceptions of the consumers. Through the distribution of our consumer survey to forty-five of the market's customers at Ubonrat hospital stalls, the team learned that their interest in organic foods was very low. Of those surveyed, about 42% said they rarely buy organic foods, and about 16% never buy them at all. Analogously, about 69% responded that they had little to no interest in learning more about organic foods, and about 62% had little to no trust in organic food labeling. It quickly became clear that local consumers had little regard for certified organic produce.



Interestingly, even consumers with low trust in the organic label were still very influenced by it, suggesting that they value the principles behind organic farming. Their choice to shop at the market supplied by the farms under the Kham Koon Center, which have a reputation for trying to employ better farming practices, also supports this theory.



Based on Figure 3, one can consider the correlation between the level of trust in the organic label and the level of influence that trust plays in buying organic products. Most of the time, when consumers have trust in the organic label, they said it has little influence on their decision to buy organic products. This demonstrates how consumer trust is not directly influenced by consumer decision to buy organic foods based on the influence.

4.1.2) Finding 2: Improper use of pesticides is negatively impacting the health of the community.

The team learned several crucial pieces of information regarding local pesticide use from discussions with the founder of SCDF as well as Mr. Martin Wheeler, a farmer in the

Khon Kaen region who offered his expertise on farming practices in the area. Dr. Tantip Thamrongvarangoon explained that the Hospital was finding high concentrations of pesticides in the general population's blood, mainly appearing as elevated levels of cholinesterase-inhibiting chemicals. From our literature review, the team was aware that chronic exposure to such leads to muscle weakness and neurological dysfunction. In agreement with this, Mr. Wheeler described how companies avoid government restrictions and promote misinformation by marketing the same active ingredients under many different names, increasing confusion about proper handling amongst farmers. Not only was it apparent from this that pesticide misuse is negatively impacting the health of the community, but it can also be concluded that the general public requires additional education on the harmful effects of consuming produce that has been exposed to pesticides in excess.

4.1.3) Finding 3: Organic certification is not feasible for this community at this time.

Certified, organic produce is evidently the healthiest and safest option for both consumers and farmers; however, in an environment where the majority of farmers used pesticides and non-organic methods, achieving this goal becomes more difficult. While conducting the observations and interviews it became evident that some organic requirements were a long way from being met due to a lack of community resources.

Theme 3: Practices Violating Organic Standards		
Aspect of Theme	Number of farmers it pertains to	Percentage of this aspect that was seen across the entire theme
Groundwater, pond water, or tap water is used	8	29.63%
Chickens/ducks can roam freely/come into contact with produce	5	18.52%
No method of traceability	3	11.11%
Nearby plot uses chemicals	1	3.70%
Benkoguard used for cleaning livestock	1	3.70%
Dogs on the farm	9	33.33%
Total Responses pertaining to theme	27	

Table 1: The table displays the theme, practices violating organic standards, and the phrases that fit into this theme from the farmer interviews.

Overall, the observation notes played an important role in determining the practices that are feasible to become organic and identifying barriers farmers might face. The observation notes were divided into different sections including Actions Taken to Avoid Contamination, Livestock, Poultry and Fish, Product Management, Storage and Transportation, General Conditions, Minerals and Quality of Soil, Pesticides and Plant Disease, and Fertilizers. These observation notes were compiled into Appendix E. An example of one of the observation guides and how they have been filled out are given below:

Products management storage and transportation		
Are the products labeled with a barcode?	labeled by putting the package of the seed next to the plot	Note how the products are labeled and what is on the label? (barcode, sticker, etc.)

Table 2: Uncertified Farm 2 observation guide table of product management, storage, and transportation.

Proximity to water or soil contaminating sources	nearby pond, small and green	
Proximity to other, non-organic farms	sons nonorganic cassava farm that uses chemicals is right next to her farm, very close to where she harvests the bananas; tried to slope it and have a separation between the farms	

Table 3: Uncertified Farm 3 observation guide displaying proximity to water or soil contaminating sources, and proximity to other, non-organic or chemical-using farms.



Pesticides and Plant Disease		
Intercropping and Companion Planting	mostly mono-cropping	Planting different kinds of plants together that will help them all grow better
Biological Pest Control	problems with moles, but moles die and become fertilizer	Use of a beneficial organism to get rid or avoid pests
Buffers and Barriers	lime trees in cement pots to separate roots, leafy greens separated by a couple of feet between seeds with a small hole dug for it, bamboo trees about 5 feet apart	Usually used if there is a risk of contamination

Table 4: Uncertified Farm 1 observation guide table of pesticides and plant disease.

Minerals and Quality of Soil		
Supplemental Fertilization	rice ash fertilizer	Nitrogen is added when the plants are weak due to a nitrogen deficiency and creates biological diversity that stops pests
Intercropping and Companion Planting	leafy green plant growing next to banana trees	
Soil preparation	soil very dry	

Table 5: Uncertified Farm 3 observation guide table of minerals and quality of soil

From analyzing the data gathered in the observation notes as well as the interviews, it was found that most of the farmers have no system of labeling or tracing the products they grow, which is apparent in Table 2, where the farmer from uncertified farm 2 labeled their plot by placing the package of seed next to where it was planted. The package can be moved or damaged in this area and is an inefficient method of tracing products. Along with this, the team noticed that most farmers sourced their water from nearby ponds, which is seen in Table 3 from uncertified farm 3. This table also depicts the farm being in close proximity to another farm that uses chemicals, demonstrating this barrier that many of these farmers face in organic certification. From Tables 4 and 5, the team also noticed that most farmers had their own unique methods of pest management, such as intercropping or using barriers. They also all had methods for fertilization and managing soil quality. Based on these observations, our team discovered that the farmers are experts in organic farming concepts such as IPM and fertilization, and are actively making efforts to reduce their use of pesticides. However, the contamination from ponds and the lack of traceability pose major barriers to organic certification.

	
<p><i>Figure 12: The photo was taken of the source of water, a pond, on Uncertified Farm 3.</i></p>	<p><i>Figure 13: The photo was taken of the source of water, a pond, on Uncertified Farm 3.</i></p>

One main analysis based on the observations, pictures, videos, and interviews was that most of the farms use water sources that are contaminated or sources that are unable to

be verified for cleanliness. The images above depict two farms that source their water from nearby ponds. It is unknown whether the water from these ponds is clean or safe to use on crops. In organic farming, the source of water cannot be contaminated and must be regularly tested for any contamination. Water is a scarce resource, especially in this area of Thailand, hence it is very hard to obtain it from a non-contaminated area. Therefore, the source of water would be a difficult factor to control and is a significant barrier for a farmer looking to change to organic.



Figure 14: Dogs roaming freely on Uncertified Farm 7.





Figure 15: Dogs roaming freely on Uncertified Farm 8.



Figure 16: Chickens roaming freely on Uncertified Farm 6.

In addition to issues related to water, there were also dogs roaming freely on every farm, and chickens and ducks roaming freely on several of the farms. The above pictures show examples of dogs and chickens roaming freely around the produce plots. These are just

three examples of free-roaming animals from the farm, but every farm of the ten that the team visited had free-roaming animals. Based on all of the organic certifications the team researched, free-roaming animals of any kind are not allowed. Therefore, most certifications require some sort of fencing around all of the crops to keep animals out. There are many dogs roaming freely around the Khon Kaen area in general, making it difficult to comply with this regulation. Also, it would be very expensive to put fences around all the growing plots to keep dogs and other animals away and off of the produce.

	
<p><i>Figure 17: Farmer from Uncertified Farm 3 attempts to create a sloped barrier between her farm and her son's farm which uses chemicals.</i></p>	<p><i>Figure 18: Neighboring son's farm next to Uncertified Farm 3, which uses many chemicals and pesticides to grow cassava.</i></p>

In addition to the sources of water and the free-roaming animals, one of the farmers (Uncertified Farm 3) acknowledged that her son's neighboring farm uses chemicals to grow cassava. Although she has attempted to avoid contamination of her crops by creating a slight slope between the two farms, which is depicted in the images above, the proximity to her son's pesticide-spraying farm makes her farm not organic. This is a very large barrier in organic certification because she would have to move the location of her entire farm, or severely reduce the area in which she farms to be further from her son's farm. Both of these options are not feasible for this farmer at this time.

While the farmers are invested in having safe farming practices, it is unfeasible to incorporate certain elements such as fencing and changing water sources with the current resources that these farmers have. This is the reason behind choosing to forego organic certification in light of improving practices that are more easily modified.

4.1.4) Finding 4: Farmers are interested in adjusting their practices and obtaining GAP certification.

Our interviews with the farmers under the Kham Koon Center revealed that there is an overall interest in improving agricultural practices, especially because of the positive impact it will have on their community. This popular opinion amongst the farmers can be shown by our interview coding under the “Attitudes Towards Organic Practices” theme:

Theme 2: Attitudes toward Organic Practices		
Aspect of Theme	Number of farmers it pertains to	Percentage of this aspect that was seen across the entire theme
Non-chemical vegetables stay fresh longer/are better quality	2	13.33%
Happy and proud to sell organic foods	7	46.67%
Organic foods support the health of the local people	6	40.00%
Total Responses pertaining to theme	15	

Table 6: The table displays the theme, attitudes toward organic practices, and the phrases that fit into this theme from the farmer interviews.

47% of the farmers who mentioned aspects of this theme stated that they are ‘happy and proud to sell organic foods’, and 40% said something along the lines of recognizing how ‘organic foods support the health of the local people’. This data displays the interviewed farmers’ enthusiasm to grow better foods, their knowledge of the benefits of organic, and the

effort that they are willing to put in to help their community. It seems like a good proportion of farmers have a thorough understanding of the importance of safe farming practices and are taking measures to maintain the quality of their produce. Although the farmers have little knowledge about the proper storage and transportation of produce, they are able to follow basic farming requirements.

4.2) Analytical Insight 2: It is necessary to gather information about the Good Agricultural Practices (GAP) certification process to determine gaps in farmers' preparedness for the process and inspection.

After determining that the focus of the project must be shifted from organic certification to GAP certification, the team decided to gather more data about the GAP certification processes, including the necessary documents, how to prepare for the inspection dates, and the best alternative farming techniques to help make the process easier. The two findings below helped the team gather all of this information to better equip the farmers to pass the certification, and improve their overall practices.

4.2.1) Finding 5: There are alternative, safer farming techniques for farmers to implement in their own practices to make GAP certification easier.

The farmers under the Kham Koon Center have a good amount of knowledge pertaining to organic methods and pest control. They are making use of manure fertilizers to neutralize the soil and herbal solutions as well as washing instead of harmful chemical products to control pests and insects. This is shown in Table 7, where 32% of the theme respondents stated that they use organic fertilizer, and 14% stated they wash produce and pick out insects by hand.

Theme 4: Practices Complying with Organic Standards		
Aspect of Theme	Number of farmers it pertains to	Percentage of this aspect that was seen across the entire theme
Manure and fermented fertilizer (dormite; cow and chicken manure mixed with bioextract)	7	31.82%
Feed chickens/ducks with leftover vegetable, rice bran, banana, or chicken feed	5	22.73%
Picks out insects from produce	3	13.64%
Washes vegetables before packing	3	13.64%
Some sort of recording of produces	3	13.64%
Rice ash mixed with water to prevent insects; vinegar and alcohol mixture to prevent insects	1	4.55%
Total Responses pertaining to theme	22	

Table 7: The table displays the theme, practices complying with organic standards, and the phrases that fit into this theme from the farmer interviews.

Although farmers use some organic methods, it seems these methods could be more widely spread, as less than half of the respondents were currently using them. However, these natural methods are not as widespread as they could potentially be. This is where the creation of the handbook comes into play, it will be used by the farmers to communicate organic methods to each other because they are the ones reviewing and suggesting all of the information inside it.

Along with farming techniques that were suggested by the farmers, methods that the team researched and learned in interviews were included in the handbook. The major takeaways from the interview with two members of the World Vegetable Center (Ms. Sopana Yule, who is an entomologist, and Ms. Somchit Pruangwitayakun, who is a vegetable and research training officer) (Appendix K) were the methods that they suggested in terms of pest management, such as the use of vegetable grafting, trap crops, using nematodes, biopesticides, botanical extract, and the use of Bt (*Bacillus thuringiensis*).

In order to properly analyze and organize the data gathered from this interview, the team created interview color codes to categorize the information. The team broke these into

four main categories: Pest management, Pesticide Use, Training, and Certifications. After creating these codes based on relevant topics, the team highlighted phrases from the interview pertaining to the codes and compiled these quotations into a list. The themes and table with phrases pertaining to the themes are displayed in Appendix L.

From our visit to SAFETist Farm, the team obtained several insights and knowledge from the interview with an operator of the farm, Mr. Thawatchai Sirasang. The team learned multiple farming practices that could be adapted to use in farms under Kham Koon Center (Appendix J). For example, the use of bio extract to prevent pests and insects, employ the use of raised gardens to prevent the crops from the flood. The team acquired some local knowledge such as the determination of the quality of cow manure by adding earthworms as an indicator.

After gaining some basic information about this local knowledge and alternative methods for pest management, the team completed further research and included these in the handbook for the farmers. In addition, the team also included advice on the overall pesticide use if farmers have no other option but to spray them. This included screening to select suitable pesticides, reading and following all of the instructions on the package, and stopping spraying the chemicals at least one to two weeks before the harvest of the crop.

4.2.2) Finding 6: Lack of preparedness for GAP inspection is a major barrier to certification.

Given that it is not currently possible to switch to completely organic farming or apply for PGS certification, the most optimal solution is to apply GAP standards. Therefore, an extensive investigation of GAP was performed, which allowed the team to create a handbook and infographics to help educate the community on GAP standards and better farming practices. The handbook and infographics were developed in a way that the farmers can

understand them easily. The Department of Agriculture (DOA) in Khon Kaen is typically responsible for overseeing the day-to-day operations of the agricultural sector, including the production of crops and vegetables. They have the most expertise and experience in this area and are open to sharing information and providing guidance to help the team successfully carry out the project. The team asked GAP inspection officials from the DOA in Khon Kaen, Mr. Anat Nundee and Ms. Chuleekorn Leenonlan, questions regarding the certification process, documents required, and how to better prepare for the inspection. The information obtained from the interview is summarized in this section.

In terms of the certification process, the application process for certification can be complex, especially for farmers. Therefore, it is important to follow the guidance provided by the DOA and to submit the application to the correct location, whether it be the district, state, or province-level department of agriculture. The guidance and the steps for the application are also provided on their website for further information.

The GAP inspectors are also advising the farmers, mainly those who want to apply for the certification, to prioritize the creation and maintenance of detailed traceability records. This refers to the systematic documentation of all activities related to the farming process, such as seed selection, planting, fertilization, pest control, and harvesting. By having accurate and detailed traceability records, farmers can improve their chances of becoming certified and enhance the quality and reputation of the products.

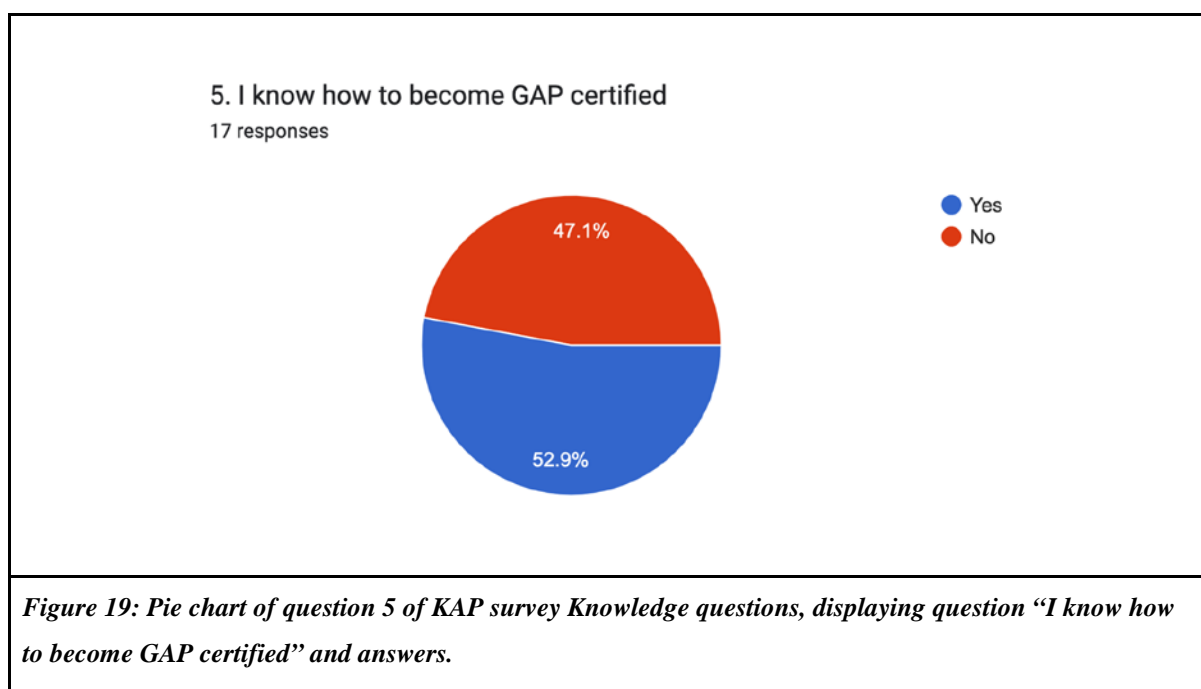
Additionally, the inspectors have notified the team that the queue for applications can be long, so it is important to apply as soon as possible to avoid delays. By following the advice provided by the DOA, it can be ensured that the application is processed efficiently and the farmers will be able to obtain a GAP certificate in a timely manner.

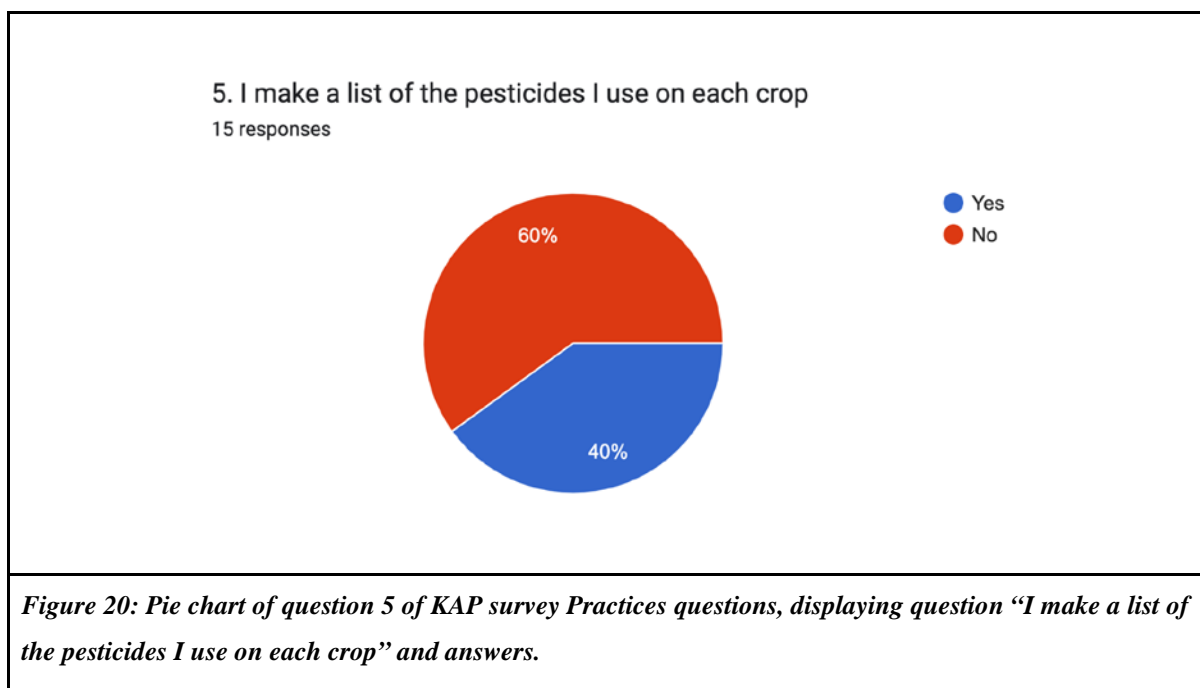
4.3) Analytical Insight 3: Pursuing GAP certification

4.3.1) Finding 7: There are gaps in farmers' knowledge about the certification process

After conducting the KAP survey, and the workshop, the team was able to identify the main gaps in farmers' knowledge about the GAP certification (Appendix I).

As mentioned in Figure 11, question 5 from the knowledge section says “I know how to become GAP certified”, to which the answers varied about half and half. Therefore, some farmers believe they do know how to become certified, and some do not. Along with this, Figure 12 below displays question 5 from the practice sections in the survey that says “I make a list of the pesticides I use on each crop”, to which 60% of farmers said no. This demonstrates the farmers' lack of traceability records when farming.





After the KAP survey revealed these two main gaps in knowledge, the team was able to better determine further gaps based on the collaborative workshop. The farmers expressed through the discussion that the main challenges and barriers to gaining the certification are the lack of traceability methods and preparedness for the inspection date. The team was aware from the GAP inspection official that the products are not ready to be harvested on the plots during the date of inspection was the main barrier to gaining certification. Therefore, the team was prepared to consider and discuss this challenge with the farmers, to determine a feasible solution. The finding that there are gaps in knowledge of GAP certification allowed the team to better formulate the collaborative workshop, and determine methods to help the farmers.

4.3.2) Finding 8: Collaboration with the community is crucial in working toward a common goal and encouraging habit changes that will last long.

After the team discussed with the farmers about the problems regarding the certification from the farming practices to the application submission, the team found that

there are several challenges regarding the process. The team discussed these problems with the farmers and suggested possible solutions. The team exchanged ideas with them and was able to determine a suitable course of action through Participatory Action Research (PAR).

By applying these principles, the team recognized the farmers' roles as experts and worked together as a collective in order to come up with potential solutions. The team acknowledged that any aspect of our project developed without their input would significantly limit its efficacy. Additionally, it would be ethically wrong to conduct research on behalf of a group of people without their involvement. Based on our first four findings, the team created infographics and an informative handbook to aid in our overarching goal of improving community health. Rather than distribute these to the farmers immediately upon completion, the team facilitated an open conversation with them during a workshop that the team held during a scheduled monthly meeting at the Ubonrat hospital. The team received feedback on the content and formatting of both and later utilized this to produce final drafts and ensure these deliverables are useful for the farmers and the community. For example, though literacy is not a challenge for any of the farmers the team interacted with, many of them had difficulties reading the font size selected and were informed that it should be increased.

In the discussion, another common issue that most farmers faced were the absence of farmers on the inspection day, and the produce was not ready for inspection. Additionally, dogs, chickens, and ducks were walking around the farm which the team suggested that they should keep in their houses or fences. However, the main significant problem was that farmers were not keeping traceability records and did not know how to record the activities on the farm. The team purposed the solution by creating a traceability record sheet and ensuring that the farmers would be able to fill out the sheet by themselves. Moreover, the traceability record requires photographs of each farming activity in order for the certificate

application to be done completely. As a result, the team along with Dr. Tantip Thamrongvarangoon created a group in the LINE application with all the farmers to be able to trace their agricultural practices such as when they should plant their crops and be prepared for the inspection and can keep the photographs of their crops and activities that are needed for traceability records, certification, and future inspection. In addition, the team and Dr. Tantip Thamrongvarangoon can use this communication channel to inform and update the information related, and discuss the problem in the future. Despite other factors, all of these could result in obtaining the certification, and the farmers would be prepared for the GAP inspection.

5. Conclusion

When the team arrived at the Kham Koon Center, Khon Kaen, for the first time, Dr. Tantip Thamrongvarangoon, one of the founders of SCDF and Kham Koon Center, introduced us to Mr. Martin Wheeler, a farmer who moved from London to Khon Kaen Province to pursue a career in agriculture a number of years ago (Appendix B). Since then, he had witnessed friends and peers grow sick and die from chronic exposure to pesticides. He spoke of communities plagued by illness due to continuous contact with these harmful chemicals, which are ever-present in the food, water, and air. Hearing these stories, the team discovered that the prolonged misuse of pesticides posed the biggest threat to the health of the community, not the lack of strictly organic practices and standards. Moreover, it became extremely apparent why change is necessary: for the sake of the well-being of the farmers, their families, and all the community members.

Rather than focus on the acquisition of an organic label, our team decided to move towards implementing Good Agricultural Practices (GAP) standards, as these proved to be a better fit for the community's resources and market. After working in collaboration with the farmers, the team learned that they were interested in and willing to use GAP farming techniques and that the lack of education about how to obtain the GAP certification was the real barrier. Our goal shifted from organic certification to the overall improvement of and education about farming practices and safer use of pesticides to ensure the future health of this community.

With this in mind, the team focused on helping the nine uncertified farm plots apply for certification according to the GAP standards, as well as supporting and working with the farmers to improve their practices for the benefit of public health. Through interviews with the SAFETist farm, the World Vegetable Center, and GAP inspection officials, as well as an

extensive literature review, the team was able to create educational infographics and a handbook about the GAP certification process and safer farming techniques.

In addition to showcasing these materials, the team held a collaborative workshop for the farmers in which participants had a productive discussion about GAP standards and emphasized the importance of traceability to prepare for a GAP inspection. Through the combined efforts of the team and the farmers throughout the workshop, the team gained important feedback about the effectiveness of our traceability record sheet, infographics, and handbook, as well as the opportunity to guide participants in applying for a GAP certification. The materials developed are designed to be educational materials suited for, not only the current farmers under the Kham Koon Center but also the entire community and future farmers who might join the Kham Koon Center.

The collaboration that took place during the workshop allowed the team to develop a deeper connection with the farmers, helping us understand the farmers' core challenges in practicing GAP and obtaining certifications, along with how we can collaborate to best improve the community. Through the dedication of the farmers under the Kham Koon Center, proper pesticide usage techniques and GAP farming strategies will protect the local welfare, preventing illness at its roots.

5.1) Recommendations

This section contains a summary of the components of the team's recommendation to the Kham Koon Center community for the continuation of Good Agricultural Practices (GAP) and the safer use of pesticides. To address public welfare, the team devised the following: the team recommends that **the materials that the team created serve as a foundation to establish a Community of Practice (CoP) within the Kham Koon Center in order to continue the improvement of community health.** This overarching recommendation is devised of the following sections:

1. Decrease the amount of pesticide misuse and incorporate safer agricultural practices at local farms

The misuse and overuse of pesticides are harmful to the health of the community, but it is not feasible for the farms to discontinue using them altogether. For this reason, the team suggests that the Kham Koon Center implore farmers to practice proper pesticide application and handling. Aided by the philosophies of GAP, emphasizing the significance of these methods will lay the grounds for safer agriculture. The infographics and handbook developed serve as visual and written outlines that farmers can follow to improve the quality of their agricultural techniques, and should be utilized in this effort. Additionally, workshops, such as the one provided by the team assisted with, will vitalize this move towards decreased pesticide misuse, and the team recommends that these continue to be held.

2. Maintain support and encouragement from the Kham Koon Center to assist the farmers striving for GAP certification.

Unlike the rigidity of organic standards, GAP certification is attainable for these farms, and working towards earning this certification necessitates that farmers exercise safe agricultural practices, thereby protecting community health. Through continued support from the Kham Koon Center, farmers will possess the knowledge and motivation to pass the certification successfully.

3. The ongoing promotion of GAP through community outreach and distribution of educational materials to other farmers.

The most effective tool to create change for the betterment of society is education. To ensure the longevity of our efforts, the materials provided by the team should be shared with both current farmers and younger generations. For this reason, we recommend that the Kham

Koon Center work together with the farmers to deliver and explain the handbook to them, encouraging them to implement the practices in their farms and pass on what they learn to future farmers.

Furthermore, the team considered various training sessions the center can host at its monthly meetings, such as Integrated Pest Management (IPM), vegetable grafting, pesticide handling, and education about the GAP certification process. The team believes that these training sessions are useful for farmers to achieve sustainable and long-term goals. The team recommend that the sponsor and the Kham Koon Center continue to encourage participating farmers to learn more about how to use organic methods, as well as how to become organically certified.

5.2) Limitations

Although the team was able to lay the foundation for a Community of Practice (CoP) and create materials to help farmers apply for GAP certification, our project is limited by its specificity to the farms under the Kham Koon Center; the results of our project are catered to this small sample population. The handbook and other materials were developed to be used in Kham Koon, and are designed to address the situation and concerns of that community. Therefore, our deliverables may not be applicable for the improvement of agricultural practices elsewhere. Additional research would be necessary to determine if other areas could benefit from these same materials. A couple of the factors that should be considered when deciding this include: current community knowledge, available resources, and the amount of farmers in the region who use pesticides. For example, in a community such as ours, it is more difficult to obtain uncontaminated water for use on crops, barring farms from organic certification. However, in another community where this is not an issue, becoming certified by organic standards, such as PGS, might be more achievable and suitable.

5.3) Further Research

The Future of Farming and GAP

In order for our project to have an ongoing, positive impact on the health of the community, it is important that younger generations entering the agricultural field also continue upholding GAP standards. The hope is that younger generations will be the future of agriculture, since their enhanced education can bring about new technologies to increase production. However, there is disinterest among the youth of Thailand in regards to partaking in the farming sector and related agricultural practices, posing a threat to the future of Thailand's farming (Roitner-Schobesberger, 2008). In order for the proper use of pesticides to continue, it is crucial for the young generations to become more engaged and aware of this prevalent health issue. Therefore, an interesting research project in the future would be investigating how to mobilize and engage the youth in Thailand's farming sector and the proper use of pesticides.

PGS Certification for the Future

The team determined that fully organic certification was simply not feasible for the Kham Koon Farming community at this time due to significant barriers. Although the team collaborated with these farmers to apply for the more suitable GAP certification, the team do not want to abandon the potential for eventually obtaining PGS certification. PGS certification, as mentioned in the background section, requires chemical-free production, and every aspect must be completely organic. This may not be feasible for immediate implementation, but the team has included some basic steps on how to apply for PGS certification and its requirements in the handbook so that, in the future, farmers who wish to change their plots to purely organic will have the necessary information on how to do so. Changing the practices of the farmers to be completely organic and fit the standards of PGS

would be a very difficult and long process, and would require extending the duration of the project beyond two months. Furthermore, convincing and educating the farmers will be a challenging step, as farmers mentioned that completely stopping the use of chemicals would be difficult. Nevertheless, it would greatly improve community health because of the complete elimination of pesticides. Based on the work done concerning PGS in other small, rural communities throughout Asia, it is possible to motivate a group of farmers to apply for this kind of certification together. The team proposes that assisting farmers in adjusting their practices to include less or no chemicals and register for PGS certification could be another possible project to continue the one the team has completed.

In summary, although many believe the official organic label is crucial to the health and well-being of society, and for consumers' access to healthy foods, the team concluded that this certification alone does not guarantee or equate to good health. As opposed to simply imposing standards based on those employed by the farmers of other areas, choosing a certification that is feasible and suitable for a certain community is far more challenging, but also far more rewarding. By identifying standards that are achievable for the Kham Koon Center community, the team brought the people of this region a step closer to healthier and happier livelihoods through the improvement of the foods that are consumed and the surrounding environment. The team also empowered the farmers who directly control human health to work together for the betterment of their own community. The team recognized that collaboration with a community, rather than research conducted without their involvement, is much more effective in producing a long-lasting impact and sustainable results.

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Appendix A - Sponsor Description

Overview of the history and the mission of the sponsoring organization

The Sustainable Community Development Foundation (SCDF) (2022), Khon Kaen, is a non-profit organization focused on tackling social, economic, and environmental issues that impact health through means of community building. In 1995, the founders of the Sustainable Community Development Foundation Khon Kaen, Dr. Apisit Thamrongvarangoon MD. and Dr. Tantip Thamrongvarangoon MD., recognized the deforestation and infertile soil from long monoculture cash crop farming in Northeastern Thailand. This region is considered the poorest, along with having the hottest and driest climate in Thailand. Furthermore, as a person who works in the medical field, the doctors started to observe the progressive deterioration of villagers' health and quality of life in this area. The number of patients in the hospital was also continuously increasing due to a variety of health issues. As a result, they established a non-governmental organization, SCDF, in order to eliminate the root of the health problems in this area at the social, economic and environmental levels. They also wanted to empower people within the community to be self-sufficient and achieve a good quality of life.

They achieve these goals with a variety of approaches, such as connecting peers that can help each other and creating workshops that empower individuals to meet as a community to discuss their issues. Through the aforementioned forward thinking and research, SCDF strives to bring an “ideological shift” to Northeastern Thailand.

Over the years, this establishment has evolved into an educational center for local learning such as traditional medicine, integrated farming, reforestation and conservation, women's network, HIV/AIDS community, and other self-help methods that encourage members to be proactive about their health and environment. They have grown to be a

completely self-sustainable farm, selling abundant organic fruits and vegetables to a variety of locations.

One of the institutions they sell to is the Ubonrat Community Hospital, which provides funding to the SCDF. The hospital's mission is to provide holistic and integrated services that cater to "the heart of human beings" through a system that meets professional standards. They strive to develop their personnel and promote teamwork while creating a strong sense of community. Employing "H2S5" values, which include humanization, happiness, safety, standards, satisfaction, sufficient economy, and sustainability, the hospital's actions are always carried out with the community in mind.

The relationship between the hospital and the SCDF has proven to be beneficial to the foundation, farms, and hospitals. Some of the disabled patients from the hospital have been employed on the Kham Koon Farms, while these farms sell fresh produce to the hospital kitchen. While advantageous, this partnership has not been able to provide the hospital with enough produce. Therefore, Dr. Tantip decided to invite neighboring farmers in the Khon Kaen area to sell their products to the hospital kitchen. By doing this, these farmers have been able to increase their profits, while the hospital has simultaneously been able to provide safe and sufficient food to the patients and community. This organization strives to improve and serves as a typical example of how sustainable practices can greatly impact an entire community

Challenges to your sponsor's ability to accomplish its mission and the proposed project and the importance of the proposed project to the sponsoring organization.

Despite executing many missions and projects, there are some challenges the sponsor has encountered in accomplishing her goal. One of the main challenges the sponsor faced for the proposed project is the lack of knowledge amongst the farmers regarding the process of

obtaining organic certification and the safe and appropriate use of chemicals. Currently, chemical fertilizers and pesticides are very popular amongst the farming community, especially in Thailand, since it is more convenient and cheaper. Apart from the benefit of using chemicals, the farmers are unaware of the danger and unable to afford safer methods to prevent pests and insects. Therefore, to improve community health, education will play an important role in achieving a better understanding and awareness of safe practices.

The importance of the project to the sponsoring organization is to provide knowledge about the certification process, and regulation for organic products and promote community health by spreading awareness of Good Agricultural Practices and safer consumption.

Appendix B - Initial Meeting with the founder of the Kham Koon Center,

Dr. Tantip Thamrongvarangoon

When: Thursday, January 12th, 2023, 3:50 PM

Researchers: Napatsorn Chadanutakul, Pakkarin Putpongphaew, Yavitha Siri-u-vithtaya, Surangkana Srichantamit, Sophia Islam, Sophia Mularoni, Theresa Rosato, & Joelis Velez Diaz

Other Participants: Dr. Tantip Thamrongvarangoon, Aj., Mr. Martin Wheeler

Agenda:

1. Team Introduction
2. Team discussion about Sponsor goals and current mission of Kham Koon Center
3. Team meets Mr. Martin Wheeler
4. Discussion about objectives of project

Below is a summary of notes taken during the initial visit with one of the founder of SCDF, Dr. Tantip Thamrongvarangoon, and her colleague, Mr. Martin Wheeler. The team had questions as a guide for the meeting, but it was more of a discussion to learn more about the Kham Koon Center and grasp the sponsor's goals.

The major takeaways from the discussion with Dr. Tantip Thamrongvarangoon:

About the Center:

- The Kham Koon Center is a 29 year old learning center for handicapped people to learn about agriculture, gardening, and planting
- There are 49 handicapped workers a part of the center

- The center has a partnership with the Ubonrat Hospital to employ some of the handicapped or disabled people looking for work
- Some of the handicapped people work in the hospital kitchen, some work as doctor's assistants, and some help to record the stock of the Kham Koon Center's shelves when they collect produce from farmers.
- Ramathibodi Foundation is a medical school in Bangkok that helps provide funding to the hospital and helps with the cost of transporting vegetables
- Each farmer that is a part of the Kham Koon Center receives 1000 Thai Baht a month (250 Thai Baht a week)
- At one point, the center tried to implement a digitized traceability system using barcodes, but it was too complicated. Instead, they decided to use colors to indicate the days of the week, and also record the name of the vegetable, name of the farmer who grew it, and the price they will sell it at.
- The center wants to expand their market, but they do not have the capacity right now. In the future, they want to sell to Ramathibodi, but there is a large transportation cost from Khon Kaen to Bangkok, so it is not feasible right now

About the Problem:

- The Ubonrat Hospital has been finding traces of cholinesterase-inhibitors in patients' blood, which is presumed to be from pesticide use
- There is a blood test that is positive for chemical ant killer chalk powder to repel termites
- The hospital is trying to explore the cause of the chemicals in patients' blood

- The hospital and center believes that good health comes from good food and behavior, and they have a slogan: “you have to build your own health and fix it first at the root, so you do not have to fix it at the end”
- There is a group of selected farmers the team are working with that are willing to change their habits and join the GAP initiative
- Other farmers setting an example and changing their practices helps influence other farmers to follow
- Farmers in the center often use insecticides on the cows because they have fleas and bugs
- When trying to certify a vegetable plot, the farmer must have the plant growing on the farm at the time of the inspection. If the plant is not producing at the time of the inspection, they must make a new inspection appointment date.
- The organic certification they are aiming for lasts for 2 years
- GAP is Good Agricultural Practice, and this is what the center is currently looking into obtaining for the farmers
- An infographic or video for the farmers might be helpful to create
 - What to include: how the team are using GAP and not organic, what is GAP, how can farmers achieve GAP, inform them about why the hospital and center partnership is so important and beneficial

The major takeaways from the discussion with Mr. Martin Wheeler:

- Trust in the products is not an issue in this community because it is a small area and people already know what the farmers are doing. There is already an implicit trust in Thailand among the communities
- The issue is with traceability and accountability

- There are chemicals in people's blood
- There is very little organic farming in this region
- There need to be alternative ways to solve health problems other than just giving people drugs
- The main point is to improve the health of the community
- Some farmers have an issue getting regular and sufficient income from their farms
- Restrictions for certification are very stringent for farmers and the Northeastern part of Thailand is trying to provide a way to educate people about the certification in the right way. These restrictions include everything from water to seeds to the distance of the farms to the roads
- People are not aware of how to use pesticides and chemicals safely

Main Objectives Based on Discussion with Dr. Tantip:

- Identify what is happening in the community and the types of chemicals used in the farms
- Try to figure out how to help the farms become GAP certified
- Find the best methods for educating the community about GAP and safer pesticide use



Appendix C - Hospital Consumer Survey

Exclusion Criteria: The study will exclude any children, senior citizens, or disabled persons who do not purchase their own groceries.

Risk Mitigation: Subjects may skip any question they do not wish to answer and/or may withdraw consent from the study at any time without repercussion. Confidentiality risk mitigation will be addressed in the IRB application.

Statistics: The team plans to analyze the data collected to gain a better understanding of Thai consumers' attitudes toward and perceptions of organic foods. This may include graphics, statistics, or charts to better display the data.

Listed below are the survey questions:

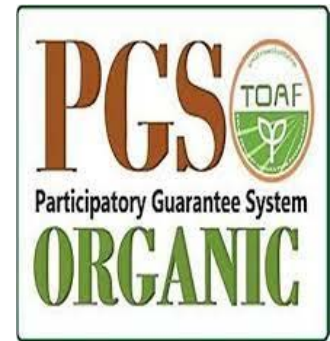
Survey for Consumers in Hospital

1. How old are you? (Check one answer)
 - ☐ 18-24 years old
 - ☐ 25-30 years old
 - ☐ 30-40 years old
 - ☐ 40-50 years old
 - ☐ 50-65 years old
 - ☐ Over 65 years old
2. What is your gender? (Check one answer)
 - ☐ Male
 - ☐ Female
 - ☐ Prefer not to say

3. Do you buy your own groceries? (Check one answer)
- ☐ Yes
 - ☐ No
4. How often do you buy organic foods? (Check one answer)
- ☐ Never
 - ☐ Rarely
 - ☐ Sometimes
 - ☐ Always
5. About what percentage of the groceries you currently buy are organic? (Check one answer)
- ☐ 0-25% organic
 - ☐ 26-50% organic
 - ☐ 51-75% organic
 - ☐ 76-100% organic
6. What level of knowledge do you have of organic foods? (Check one answer)
- ☐ 1 (very little knowledge)
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5 (very high knowledge)

7. What level of knowledge do you have of the PGS organic certification label?

- ☐ 1 (very little knowledge)
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 (very high knowledge)



8. What level of trust do you have in organic food labels?

(Check one answer)

- ☐ 1 (very little)
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 (very high)

9. How interested would you be in gaining more knowledge about organic food? (check one answer)

- ☐ 1 (no interest)
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 (very interested)

10. How much influence does trust in organic labels have on your decision to buy organic foods? (check one answer)

- ☐ 1 (little influence)
- ☐ 2
- ☐ 3

- 4
- 5 (very large influence)

11. How much more expensive per kilo are organic foods than nonorganic foods in Thailand usually? (check one answer)

- 0-37 baht more expensive
- 37-185 baht more expensive
- 186-370 baht more expensive
- 371-555 baht more expensive
- 555-740 baht more expensive
- More than 740 baht

12. Are organic foods accessible to you? (check one answer)

- Yes
- No

13. Are you willing to pay more for organic foods? (check one answer)

- Yes
- No

14. What kind of produce would you prefer to buy organic over non-organic? (check all that apply)

- Fruits (mango, banana, tomatoes, avocados, etc.)
- Vegetables (leafy greens, cabbage, potato, cucumber, spinach, etc.)
- Meats (chicken, beef, pork, etc.)
- Legumes (tofu, chickpeas, beans, peas, etc.)
- Grains (wheat, rice, oats, etc.)
- Other (please list):_____

Translated Survey (Thai):

แบบสอบถามความคิดเห็นของผู้บริโภคถึงสินค้าออร์แกนิก

ขออนุญาตสอบถามความคิดเห็นของผู้บริโภคเพื่อนำไปใช้ประกอบการดำเนินงานพัฒนา
ค้าคุณฟาร์มในโครงการ IQPISSP 5 ของภาควิชาเคมีประยุกต์ คณะวิทยาศาสตร์ จุฬาลงกรณ์
มหาวิทยาลัย ทั้งนี้หากท่านไม่สะดวกใจที่จะตอบคำถามบางข้อ ท่านสามารถข้ามข้อนั้นๆได้
ข้อมูลทุกอย่างจะถูกกำจัดหลังจากที่โครงการจบลง

1. เพศ (กรุณาเลือกเพียงข้อเดียว)

- ☐ ชาย
- ☐ หญิง
- ☐ ไม่ต้องการระบุ

2. ช่วงอายุของท่าน (กรุณาเลือกเพียงข้อเดียว)

- ☐ 18-24
- ☐ 25-30
- ☐ 30-40
- ☐ 40-50
- ☐ 50-65
- ☐ มากกว่า 65 ปี

3. ท่านซื้อผักหรือจ่ายตลาดเองหรือไม่

- ☐ ใช่
- ☐ ไม่ใช่

4. ท่านซื้อสินค้าออร์แกนิกบ่อยเพียงใด (กรุณาเลือกเพียงข้อเดียว)

- ไม่เคย
- นานๆครั้ง
- เป็นบางครั้ง
- บ่อยครั้ง
- ทุกครั้งที่จ่ายตลาด

5. สินค้าที่ท่านซื้อ ณ ปัจจุบันเป็นสินค้าออร์แกนิกกี่เปอร์เซ็นต์ กรุณาเลือกข้อที่ตรงกับท่านมากที่สุด (กรุณาเลือกเพียงข้อเดียว)

- 0-25%
- 26-50%
- 51-75%
- 76-100%

6. ท่านมีความรู้ด้านสินค้าออร์แกนิกมากเพียงใด (กรุณาเลือกเพียงข้อเดียว)

- 1 (น้อยมาก)
- 2
- 3 (ปานกลาง)
- 4
- 5 (มากที่สุด)

7. ท่านมีความไว้วางใจในตรารับรองสินค้าออร์แกนิกมากน้อยเพียงใด (กรุณาเลือกเพียงข้อเดียว)

- 1 (น้อยมาก)
- 2
- 3 (ปานกลาง)
- 4
- 5 (มากที่สุด)

8. ท่านรู้จักตรารับรองเกษตรอินทรีย์แบบมีส่วนร่วมตามมาตรฐาน PGS (Participatory Organic Guarantee System) มากเพียงใด (กรุณาเลือกเพียงข้อเดียว)

- 1 (น้อยมาก)
- 2
- 3 (ปานกลาง)
- 4
- 5 (มากที่สุด)



9. ตรารับรองสินค้าออร์แกนิกส่งผลต่อการเลือกซื้อสินค้านั้นๆมากเพียงใด (กรุณาเลือกเพียงข้อเดียว)

- 1 (ส่งผลน้อยมาก)
- 2
- 3 (ปานกลาง)
- 4
- 5 (ส่งผลมากที่สุด)

10. ท่านสนใจที่จะได้รับความรู้เพิ่มเติมเกี่ยวกับอาหารออร์แกนิกมากน้อยเพียงใด (กรุณา

เลือกเพียงข้อเดียว)

- 1 (ไม่สนใจ)
- 2
- 3 (ปานกลาง)
- 4
- 5 (สนใจมากที่สุด)

11. ในประเทศไทย อาหารออร์แกนิกต่อกิโลกรัมมีราคาแพงกว่าอาหารที่ไม่ใช่อาหารออร์

แกนิกมากเพียงใด (กรุณาเลือกเพียงข้อเดียว)

- แพงกว่า 0-37 บาท
- แพงกว่า 37-185 บาท
- แพงกว่า 186-370 บาท
- แพงกว่า 371-555 บาท
- แพงกว่า 555-740 บาท
- แพงมากกว่า 740 บาท

12. ท่านสามารถหาซื้ออาหารออร์แกนิกได้โดยทั่วไปหรือไม่

- ได้

- ไม่ได้

13. ท่านยินดีที่จะซื้ออาหารออร์แกนิกในราคาที่สูงขึ้นหรือไม่

- ยินดี
- ไม่ยินดี

14. สินค้าชนิดใดที่ท่านมักจะเลือกซื้อเป็นแบบสินค้าออร์แกนิก (กรุณาเลือกทุกข้อที่ใช้)

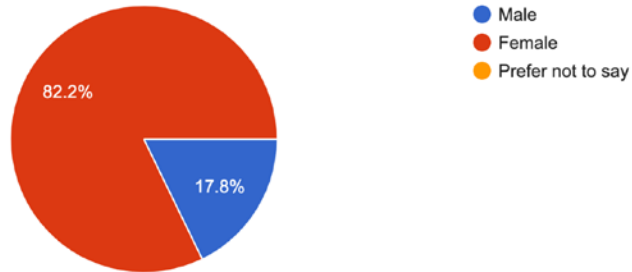
- ผลไม้ (มะม่วง, กล้วย, มะเขือเทศ, อะโวคาโด, อื่นๆ)
- ผัก (ผักใบเขียว, กะหล่ำปลี, มันฝรั่ง, แตงกวา, ผักคม, อื่นๆ)
- เนื้อสัตว์ (ไก่, เนื้อวัว, หมู, อื่นๆ)
- พืชตระกูลถั่ว (เต้าหู้, ถั่วลูกไก่, ถั่ว, ถั่วลันเตา, อื่นๆ)
- ธัญพืช (ข้าวสาลี, ข้าวสาร, ข้าวโอ๊ต, อื่นๆ)
- อื่น(กรุณาระบุ):_____

ทางกลุ่มขอขอบพระคุณทุกท่านที่สละเวลามาทำแบบสอบถาม

Appendix D - Hospital Consumer Survey Answers

What is your gender?

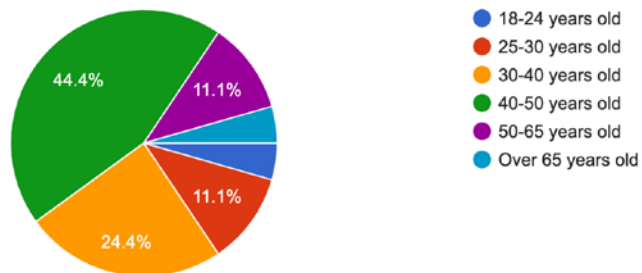
45 responses



1.

How old are you? (Check one answer)

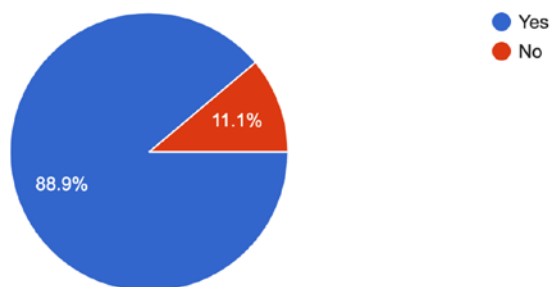
45 responses



2.

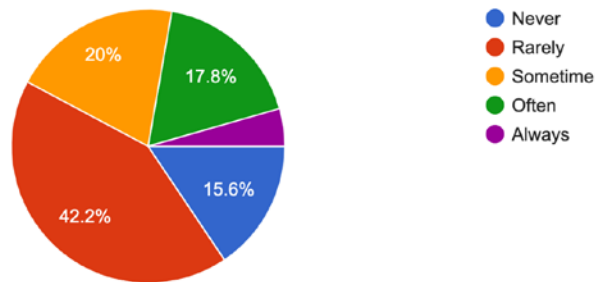
Do you buy your own groceries?

45 responses



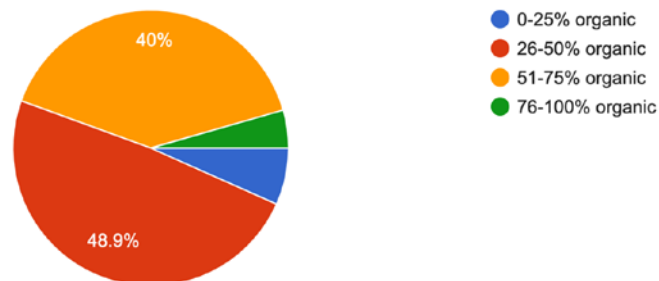
3.

How often do you buy organic foods?
45 responses



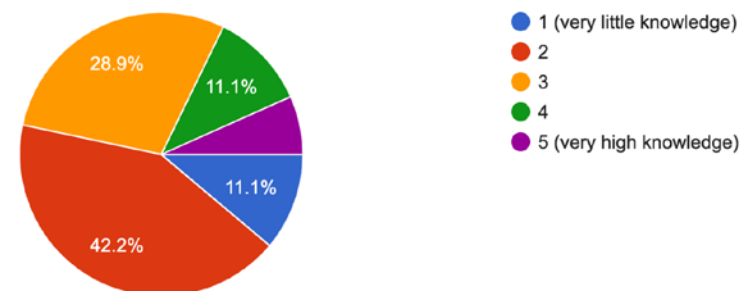
4.

About what percentage of the groceries you currently buy are organic?
45 responses



5.

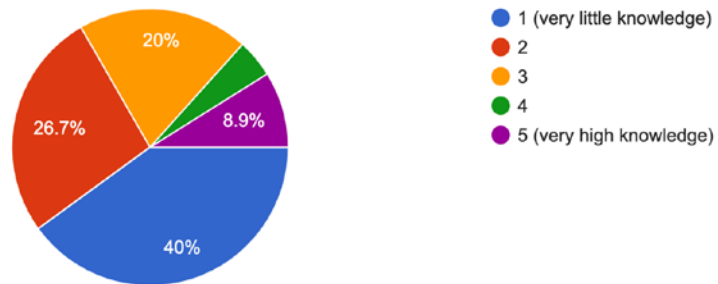
What level of knowledge do you have of organic foods?
45 responses



6.

What level of knowledge do you have of the PGS organic certification label?

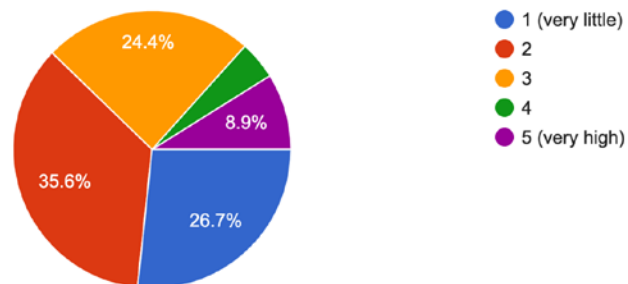
45 responses



7.

What level of trust do you have in organic food labels?

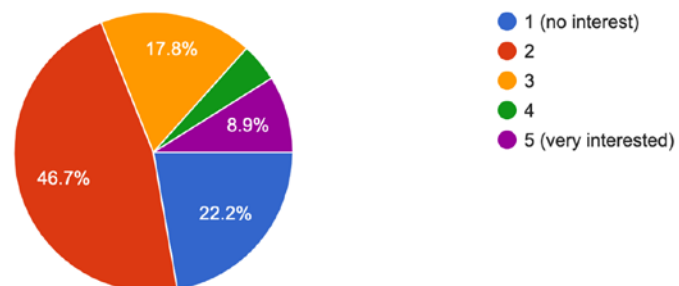
45 responses



8.

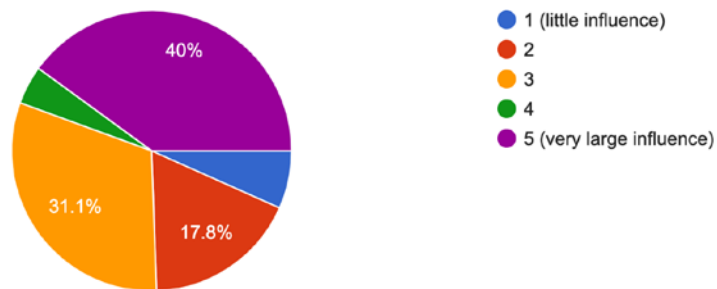
How interested would you be in gaining more knowledge about organic food?

45 responses



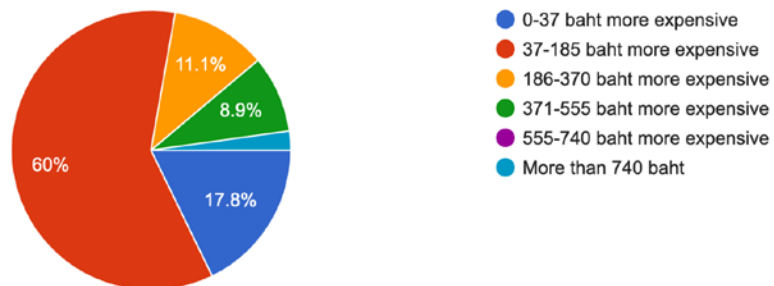
9.

How much influence does trust in organic labels have on your decision to buy organic foods?
45 responses



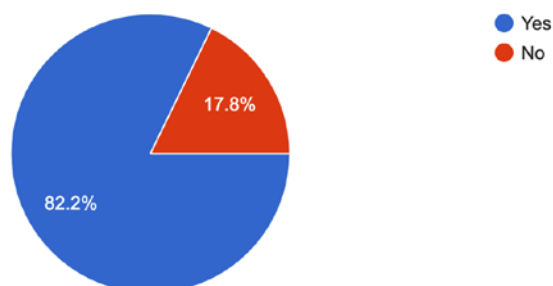
10.

How much more expensive per kilo are organic foods than nonorganic foods in Thailand usually?
45 responses



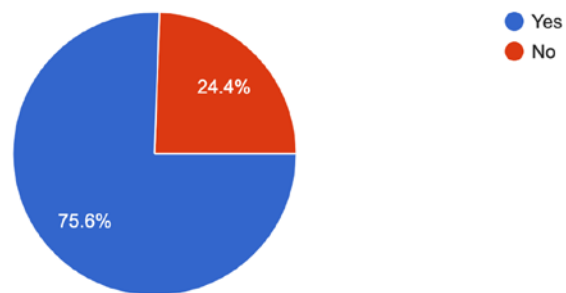
11.

Are organic foods accessible to you?
45 responses



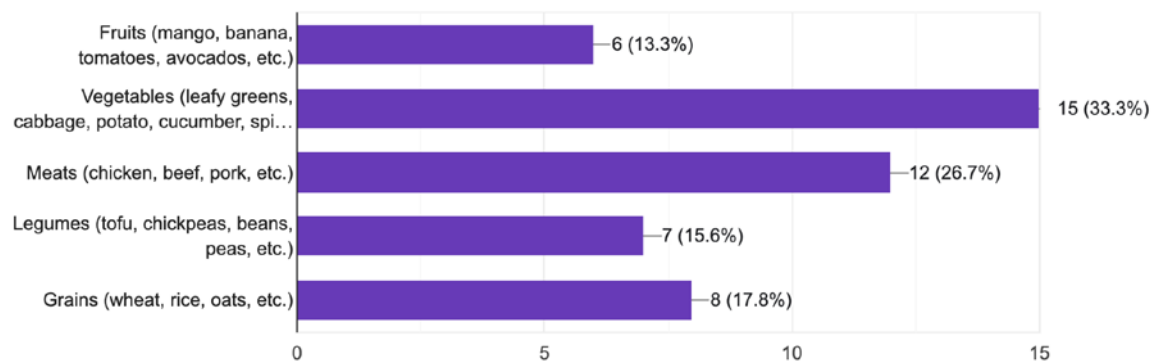
12.

Are you willing to pay more for organic foods?
45 responses



13.

What kind of produce would you prefer to buy organic over non-organic?
45 responses



14.

Appendix E - Farmer Observation Notes

Question	Notes	Guiding Questions
Farm:	Observation Note	Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources		
Proximity to other, non-organic farms		
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)		
Provide corral with a dry floor for livestock		
Maintain the chicken in the cage is prohibited		
Pig pit must has area of more than 1.5 square meters per pig or equal during fattening stage		
Sufficient room for chickens to move around		
Feed is organic		
Feed is not organic		
Products management storage and transportation		
Food handling/storage methods		How is the food prepared to go into the market/hospital?

Is the produce cleaned?		How clean is the food? How is it cleaned? Is it thorough?
Do you record all the production processes? species and quantity? harvesting, packaging and distributing day?		
Where do the production processes(packaging and storage) take place?		
Is the production process done in a clean condition?		Exclude from rats, insects, chemicals
Are the packing and handling methods organized?		
Are the products labeled with a bar code?		Note how the products are labeled and what is on the label? (barcode, sticker, etc.)
Packaged in paper		
Packaged in plastic		
Gloves used		
Station for packaging and storage is clean		
Station for packaging and storage is kept at the right temperature		
Employees		
Number of employees in the field (note time of day)		
General Conditions		
Number of crops being grown on this plot		
Irrigation		
Farming Machinery		
Plot Size (estimation)		
Drainage System		

Minerals and Quality of Soil		
Grow green manure		Green manure enhances the fertility, are plants that aren't produced for sale but for their advantages in the growth of succeeding cash crops. (this is interchangeable with cover crop)
Crop rotation		method of producing several crops on the same area in repeated succession
Cover crop		protect the soil against erosion
Supplemental Fertilization		Nitrogen is added when the plants are weak due to a nitrogen deficiency and creates biological diversity that stops pests
Intercropping and Companion Planting		
Farm manure		Decomposed plants and animals, or excreta from human and animal, administered to the soil
Compost		What is the compost made out of? How is it applied?
Outsource manure		The compost is brought from somewhere else thus there is a middleman, you can't be sure of what chemicals and toxins it might have which can be damaging to the farm
Rehabilitate the soil		
Mulching		The ground needs to be covered by something to keep the dirt and other materials from being affected
Soil preparation		

Use a farm waste as a manure		
Microorganisms from organic or natural fermentation		
Pesticides and Plant Disease		
Crop rotation		
Leave the space between for each tillage		is usually done by mechanical agitation. note: tillage affects the soil negatively
Intercropping and Companion Planting		Planting different kinds of plants together will help them all grow better
Biological Pest Control		Use of a beneficial organism to get rid or avoid pests
Sanitation		can involve different things, like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Biorational Pesticides		Includes from botanical, microbial, to minerals and synthetics. If any pesticide is used look for the specific name and brand of it, because not all of these are approved for organic.
Buffers and Barriers		Usually used if there is a risk of contamination
Durable species		
Plant scent		

Plant		
Light		
Others		
Fertilizers		
Frequency of usage		
Type of fertilizer		
Used on all the plants		
Different type depending the plant		

Question	Notes	Guiding Questions
Farm:	Previously Certified Farm	Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	dog (Kiki), preventing from official organic certification (2 yrs since last certification)	
Maintain the chicken in the cage is prohibited	chickens are kept in cage but very open and spacious, around 10 chickens	
Sufficient room for chickens to move around	yes	
Product management, storage and transportation		
Is the produce cleaned?	can eat with cleaning because they do not use	How clean is the food? How is it cleaned? Is it thorough?

	pesticides, natural fertilizers	
Employees		
Number of employees in the field (note time of day)	3 (grandmother, grandfather, son), land belongs to mother which is typical for area for women to own land	
General Conditions		
Number of crops being grown on this plot	sugar cane, rice, vegetables, dates (expensive), coconut trees (3 years old), beans, winter melon, chickens, cows	
Irrigation	use water droplet system with black pipes, they have their own water tank so it's not hard to water the plants and have enough, water comes from underground	
Plot Size (estimation)	41 rye	
Minerals and Quality of Soil		
Crop rotation	based upon market ex. price of dates went up so cleared cassava plots to plant dates, have coconuts too but gave water to dates and kept from coconuts to promote the growth of more expensive date	method of producing several crops on the same area in repeated succession
Farm manure	manure, natural fertilizer	Decomposed plants and animals, or excreta from human and animal, administered to the soil
Rehabilitate the soil	yes, they dry out the soil after each planting to make sure pests are gone	
Soil preparation	fermented rice powder naturally built no chemicals, poured over soil to help it, soil is dried first before new	

	plants are planted, if not dried out they will get pests	
Pesticides and Plant Disease		
Sanitation	crops appear very green and organized, some trash around the plot but not on where crops are grown	can involve different things, like removing the trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Plant scent	can smell eggplant flowers	
Plant	if leaves are all green it means they have chemicals, if not all green does not contain chemicals - their plants are not perfect and green because they do not use chemicals	
Light	lots of	
Others	automatic water bottle to reduce work	
Fertilizers		
Type of fertilizer	use animal manure (cows and pigs)	
PGS	certification expired 1-2 years ago	

Question	Notes	Guiding Questions
Farm:	Uncertified 1	Categorize questions into these topics: General

		Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	5 buffalo - far away from crops	
Products management storage and transportation		
Employees		
Number of employees in the field (note time of day)	2 women on the farm at 11:48am	
General Conditions		
Irrigation	blue tube running through some of the trees for water, cement tub in center with water and hose coming out, 6 large cement tubs (one broken) unsure if filled with water; has black rubber material that she puts between the plants and it can release water to them	
Minerals and Quality of Soil		
Microorganisms from organic or natural fermentation	spider webs on ground like on other farm - healthy no chemicals	
Pesticides and Plant Disease		
Intercropping and Companion Planting	mostly mono-cropping	Planting different kinds of plants together that will help them all grow better
Biological Pest Control	problems with moles, but	Use of a beneficial organism

	moles die and become fertilizer	to get rid or avoid pests
Buffers and Barriers	lime trees in cement pots to separate roots, leafy greens separated by a couple of feet between seeds with a small hole dug for it, bamboo trees about 5 feet apart	Usually used if there is a risk of contamination
Plant	lots of bamboo trees, 4 rows of leafy greens, rows of like trees, lots of rows of corn - looks healthy lots of ears growing , many rows of pumpkin	
Weeds	lime trees have cement pots around them to prevent weeds from stealing nutrients	
Others	hay at the bottom of some of the leafy greens and bamboo trees, some black plastic bags over bamboo trees	
Fertilizers		
Used on all the plants	appears to be fertilizer under the bamboo trees	
health of plants	most plants look healthy, some rows do not look healthy, plot of banana plants infected with mold because of cow manure; some potted plants look dead, some dead corn, also a lot of healthy lime trees and coconut trees, lots of pumpkins and corn growing and bamboo	

Question	Notes	Guiding Questions
Farm:	Uncertified Farm 2	Categorize questions into

		these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources	pond on farm	
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	have dogs	
Products management storage and transportation		
Are the products labeled with a barcode?	labeled by putting the package of the seed next to the plot	Note how the products are labeled and what is on the label? (barcode, sticker, etc.)
Employees		
Number of employees in the field (note time of day)	none (10am), just the owner (woman) the team are interviewing, she works here along	
General Conditions		
Irrigation	hose running throughout plots, one large blue tank for water, appear to have water from roof also running into the bin	
Farming Machinery	hang water bottle with chemicals inside for insects	
Plot Size (estimation)	pretty small, planning to expand	
Minerals and Quality of Soil		
Farm manure	appear to use manure on	Decomposed plants and

	some of the plants	animals, or excreta from human and animal, administered to the soil
Pesticides and Plant Disease		
Intercropping and Companion Planting	intercropping - banana and coconuts with row of chilis	Planting different kinds of plants together that will help them all grow better
Sanitation	some trash around but not directly on plots, pretty clean for the most part, some stray sticks around	can involve different things, like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Buffers and Barriers	no clear barriers but plots are separated by dirt, lime trees kept in cement pots; there could be ants and insects that would eat the root of the lime plants so they put it in the pots	Usually used if there is a risk of contamination
Plant scent	no apparent scent, no bad scent either	
Plant	coconut and banana trees throughout farm, many lime trees in plots, many chilis, leafy vegetables, 2-3 papaya trees, 1-2 green onion beds, row of mango trees, possible a bed of dill?	
Light	sometimes put tarps to block the sun for freshly planted crops, otherwise fully exposed to sun, also using dead palm leaves to shade	

	baby plants	
Others	plants appear to be organized well and separated for the most part into plots	
Fertilizers		
Type of fertilizer	clumps of manure under some chili plants?	
weeds	some weeds are visible might have to have a different weeding method, but might not be affecting crops. Lime trees have cement planters around them to prevent weeds from taking nutrients	
overall plant health	plants appear to be healthy, plants that are growing fruit - limes, bananas, papaya, mango, chilis; spiderwebs scattered around mean that it is healthy because they do not use chemicals	
pests	spiderweb-like things throughout the ground	

Question	Notes	Guiding Questions
Farm:	Uncertified Farm 3	<p>Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing</p>

Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources	nearby pond, small and green	
Proximity to other, non-organic farms	sons nonorganic cassava farm that uses chemicals is right next to her farm, very close to where she harvests the bananas; tried to slope it and have a separation between the farms	
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	about 20 chickens in small cage, 2-3 roosters separated in another cage - cages are smaller than other farms, chickens can still move a little but not much; there is another large cage but no chickens inside	
Products management storage and transportation		
Gloves used	pair of gardening gloves hang on one of the banana trees	
Employees		
Number of employees in the field (note time of day)	3 - 1 man and 2 women	
General Conditions		
Irrigation	hose runs through farms, water tanks up on a wooden structure with pump; cement water tubs throughout; hose coming from little pond for water	
Farming Machinery	bins next to banana plants (for water?), watering cans, hose running into bin with water	
Minerals and Quality of Soil		
Supplemental Fertilization	rice ash fertilizer	Nitrogen is added when the

		plants are weak due to a nitrogen deficiency and creates biological diversity that stops pests
Intercropping and Companion Planting	leafy green plant growing next to banana trees	
Soil preparation	soil very dry	
Pesticides and Plant Disease		
Leave the space between for each tillage	there is about 10 feet between banana trees, but green leafy vegetable growing directly under	tillage is usually done by mechanical agitation. note: tillage affects the soil negatively
Sanitation	appears to be a lot of trash around the water buckets and around farming area but not directly on crops	can involve different things, like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Buffers and Barriers	no barriers or buffers	Usually used if there is a risk of contamination
Plant	many banana trees but seem to be infested with the same mold, not growing very tall and do not have bananas; four rows of leafy vegetables (pumpkin and corn) - soil is very dry, only some rows are growing and sprouting - only leaves no pumpkins; bean tree has beans growing; 5 pots of thai eggplant	
Light	plants exposed to direct sun	

Fertilizers		
Type of fertilizer	burned rice ashes fertilizer appears to be scattered on the ground	
other animals	one dog, cows somewhere a little further away	

Question	Notes	Guiding Questions
Farm:	Uncertified Farm 4	Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources	Water ways along road	
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	have a dog	
Sufficient room for chickens to move around	no chickens	
Products management storage and transportation		
Food handling/storage methods	fertilizer bags stored outside next to farm but under roof	How is the food prepared to go into market/hospital?
Is the produce cleaned?	appears to be a room with a sink in the bag where she washes the fruit by hand	How clean is the food? How is it cleaned? Is it thorough?
Are the packing and handling methods organized?	does not seem to be a system of packing and handling	

Are the products labeled with a bar code?	no apparent labeling	Note how the products are labeled and what is on the label? (barcode, sticker, etc.)
Packaged in plastic	plastic bags	
Gloves used	no	
Station for packaging and storage is kept at the right temperature	station is open to the outdoors so it will be the temperature it is outside	
Employees		
Number of employees in the field (note time of day)	2- woman being interviewed and husband	
General Conditions		
Irrigation	hose connected to house for water, small enough where hose can reach the whole farm ; 3 large cement water tubs in addition	
Farming Machinery	trowel, watering can, hose, baskets for creating fertilizer and container to hold it	
Plot Size (estimation)	very small	
Minerals and Quality of Soil		
Crop rotation	based on season and weather	method of producing several crops on the same area in repeated succession
Cover crop	roll out mats to cover some crop beds	protect the soil against erosion
Supplemental Fertilization	fertilizer mix of sifted rice ash, wood and manure	Nitrogen is added when the plants are weak due to a nitrogen deficiency and creates biological diversity that stops pests
Farm manure	use manure from cows pigs and chickens to fertilize	Decomposed plants and animals, or excreta from human and animal, administered to the soil
Pesticides and Plant Disease		
Leave the space between for	about at least a foot left	tillage is usually done by

each tillage	between plots	mechanical agitation. note: tillage affects the soil negatively
Intercropping and Companion Planting	eggplant and herbs planted in alternating rows	Planting different kinds of plants together that will help them all grow better
Sanitation	pretty clean no trash on the crops, some trash around the lime trees	can involve different things, like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Buffers and Barriers	no barriers but plots are separated with space and dirt into very neat rows; pumpkins kept growing on a piece of wood and leaning on a cement water tub	Usually used if there is a risk of contamination
Plant scent	no good or bad scent	
Plant	3 coconut trees, 2-3 pumpkins, 3-4 lime trees, 3-4 cabbage plots, 1 thai eggplant plot, 5-6 green bean plants , 1 large aloe plant grown in a tire, guava	
Light	all plants exposed to direct sunlight	
Fertilizers		
Type of fertilizer	burned rice shell ashes, mix of pig, cow and chicken manure, and wood pieces	
health of plants	appear healthy overall and in good condition, some crops	

	look slightly dry	
plants that have fruit	lime, cabbage, thai eggplant, pumpkin, beans, corn, mango, guava	

Question	Notes	Guiding Questions
Farm:	Uncertified Farm 5	Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources	Water ways along road	
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	have a dog	
Sufficient room for chickens to move around	no chickens	
Products management storage and transportation		
Food handling/storage methods	fertilizer bags stored outside next to farm but under roof	How is the food prepared to go into market/hospital?
Is the produce cleaned?	appears to be a room with a sink in the bag where she washes the fruit by hand	How clean is the food? How is it cleaned? Is it thorough?
Are the packing and handling methods organized?	does not seem to be a system of packing and handling	
Are the products labeled with a bar code?	no apparent labeling	Note how the products are labeled and what is on the

		label? (barcode, sticker, etc.)
Packaged in plastic	plastic bags	
Gloves used	no	
Station for packaging and storage is kept at the right temperature	station is open to the outdoors so it will be the temperature it is outside	
Employees		
Number of employees in the field (note time of day)	2- woman being interviewed and husband	
General Conditions		
Irrigation	hose connected to house for water, small enough where hose can reach the whole farm ; 3 large cement water tubs in addition	
Farming Machinery	trowel, watering can, hose, baskets for creating fertilizer and container to hold it	
Plot Size (estimation)	very small	
Minerals and Quality of Soil		
Crop rotation	based on season and weather	method of producing several crops on the same area in repeated succession
Cover crop	roll out mats to cover some crop beds	protect the soil against erosion
Supplemental Fertilization	fertilizer mix of sifted rice ash, wood and manure	Nitrogen is added when the plants are weak due to a nitrogen deficiency and creates biological diversity that stops pests
Farm manure	use manure from cows pigs and chickens to fertilize	Decomposed plants and animals, or excreta from human and animal, administered to the soil
Pesticides and Plant Disease		
Leave the space between for each tillage	about at least a foot left between plots	tillage is usually done by mechanical agitation. note: tillage affects the soil

		negatively
Intercropping and Companion Planting	eggplant and herbs planted in alternating rows	Planting different kinds of plants together that will help them all grow better
Sanitation	pretty clean no trash on the crops, some trash around the lime trees	can involve different things, like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Buffers and Barriers	no barriers but plots are separated with space and dirt into very neat rows; pumpkins kept growing on a piece of wood and leaning on a cement water tub	Usually used if there is a risk of contamination
Plant scent	no good or bad scent	
Plant	3 coconut trees, 2-3 pumpkins, 3-4 lime trees, 3-4 cabbage plots, 1 thai eggplant plot, 5-6 green bean plants , 1 large aloe plant grown in a tire, guava	
Light	all plants exposed to direct sunlight	
Fertilizers		
Type of fertilizer	burned rice shell ashes, mix of pig, cow and chicken manure, and wood pieces	
health of plants	appear healthy overall and in good condition, some crops look slightly dry	
plants that have fruit	lime, cabbage, thai eggplant,	

	pumpkin, beans, corn, mango, guava	
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Question	Notes	Guiding Questions
Farm:	Uncertified Farm 6	Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources	pond right next to farm, unsure if they can use the water in it - very green	
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	chickens roaming free and chickens in a large cage, pretty spacious, many baby chickens, chickens in cages are bigger and fatter than chickens walking around. Silkworms are farmed as well	
Provide corral with a dry floor for livestock	floor is dry, chickens	
Maintain the chicken in the cage is prohibited	most chickens are in a cage but have a whole to escape if they want	
Sufficient room for chickens to move around	chickens are able to move around quite freely; about 40 chickens	
Feed is not organic	uses some sort of chemical to treat the chickens	

Products management storage and transportation		
Food handling/storage methods	mushrooms and stored in room behind chickens	How is the food prepared to go into market/hospital?
Employees		
Number of employees in the field (note time of day)	one woman	
General Conditions		
Irrigation	a couple of long hoses spread throughout the crops; hoses appear to run from the neighboring pond	
Farming Machinery	tool to spray pesticides, wheelbarrow, shovel, lawn mower	
Minerals and Quality of Soil		
Intercropping and Companion Planting	seems like banana trees are planted next to bamboo? or some other plant	
Microorganisms from organic or natural fermentation	many ants crawling around the mushrooms and chicken pen	
Pesticides and Plant Disease		
Sanitation	lots of trash scattered around but not directly where crops are grown; chicken pen appears clean with just some poop around the pen	can involve different things, like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Buffers and Barriers	no barriers around but banana trees are spread about 10 feet apart	Usually used if there is a risk of contamination
Plant	many lime trees (not in pots,	

	only a couple growing fruit)	
Light	all plants exposed to direct sunlight	
Others	soil appears extremely dry	
Fertilizers		
animals	dog on site, not sure if it's hers	

Question	Notes	Guiding Questions
Farm:	Uncertified Farm 7	Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	dogs and cows and fish	
Provide corral with a dry floor for livestock	cows kept in fence, but some are walking around	
Products management storage and transportation		
Employees		
Number of employees in the field (note time of day)	2 (wife and husband)	
General Conditions		
Number of crops being grown on this plot	egg plant, banana trees, chili, cabbage	
Irrigation	no water tap so they bring	

	water in tanks and then put it in blue buckets throughout the fields, no irrigation system, each person waters fields once a day one hour each	
Farming Machinery	spraying tool for spraying ashes to prevent pests, also uses a type of alcohol to prevent pests	
Plot Size (estimation)	6 acres vegetables	
Minerals and Quality of Soil		
Grow green manure	many cows on sight	Green manure enhances the fertility, are plants that aren't produced for sale but for their advantages in the growth of succeeding cash crops. (this is interchangeable with cover crop)
Supplemental Fertilization	seem to have a bag of some sort of fertilizer	Nitrogen is added when the plants are weak due to a nitrogen deficiency and creates biological diversity that stops pests
Intercropping and Companion Planting	plants other trees for nutrients	
Pesticides and Plant Disease		
Intercropping and Companion Planting	companion cropping with eggplant and chili	Planting different kinds of plants together that will help them all grow better
Light	plots exposed to a lot of sunlight	
Fertilizers		

Question	Notes	Guiding Questions
Farm:	Uncertified Farm 8	Categorize questions into these topics: General

		Condition: seeds, soil and water; Natural resource management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources	2 nearby ponds - one is small and green not a lot of water; one is bigger with some sort of drainage coming in from cement pipe. Water source seems pretty clean, no trash surrounding the area	
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	a few chickens and a lot of chicks walking around	
Maintain the chicken in the cage is prohibited	there is one chicken cage with a chicken and chicks inside and other chickens are roaming free; other cage with no chickens	
Products management storage and transportation		
Employees		
Number of employees in the field (note time of day)	2-1 man and 1 woman	
General Conditions		
Farming Machinery	watering cans	
Minerals and Quality of Soil		
Pesticides and Plant Disease		
Intercropping and Companion Planting	appears to leave about 2 feet in between plots, no barriers, plots are very organized	Planting different kinds of plants together that will help them all grow better

Sanitation	no garbage directly on plots, some garbage around plots	can involve different things, like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Buffers and Barriers	fencing around some of the vegetables	Usually used if there is a risk of contamination
Plant	rows of cabbage and leafy greens, lime trees (not in pots)- only a couple limes growing, banana trees (no bananas growing), 4 rows of chili plants (no chilis growing), about 6-8 papaya trees and 2 papaya appears to be growing; a couple bamboo trees around the area	
Light	exposed to direct sunlight	
Fertilizers		
Type of fertilizer	one bag of manure next to the fenced in plants and some other fertilizer; something in a grey can possibly chemicals?	
animals	3 dogs	

Question	Notes	Guiding Questions
Farm:	Uncertified Farm 9	Categorize questions into these topics: General Condition: seeds, soil and water; Natural resource

		management; Minerals and quality of soil; Pesticides and Plant disease; Actions taken to avoid contamination; Livestock; Product management, storage, and transportation; Employees; Marketing
Actions Taken to Avoid Contamination		
Proximity to water or soil contaminating sources	water on both sides of path leading up to farm, lots of water in rice fields?	
Proximity to other, non-organic farms	farm is right next to where rice is grown - unsure if this rice is grown with chemicals or not but should find out	
Livestock, Poultry, and Fish		
Treat the livestock well (maintain them on cement floor overtime is prohibited)	fish and snails growing in rice fields	
Products management storage and transportation		
Employees		
General Conditions		
Irrigation	hose running through the plant beds in between rows; big pipe coming from the pond where the rice grows	
Farming Machinery	mower, boots and shovels, hoses, roofed area with weights to hold the tarps down	
Minerals and Quality of Soil		
Intercropping and Companion Planting	Peppers and tomatoes in alternating rows	
Soil preparation	soil is very wet in this area because right next to pond with rice fields	
Pesticides and Plant Disease		
Sanitation	little to no trash around the	can involve different things,

	plot; no trash directly on plants or beds	like removing trash or crop residue, burning things, or plowing through plants to destroy any potential hiding places for pests or plant diseases. Another way to do sanitation is to clean up weed seeds that have been left on equipment before using it again, and also to sterilize tools before using them
Biorational Pesticides	wonder if pesticides are used because all fruit looks so healthy and perfect	Includes from botanical, microbial, to minerals and synthetics. If any pesticide is used look for the specific name and brand of it, because not all of these are approved for organic.
Buffers and Barriers	one barrier made of dirt separating some varied vegetables from the corn	Usually used if there is a risk of contamination
Plant	many rows of chilis - with chilis growing on them; banana trees with bananas; other leafy greens; cabbage looks very healthy; beans?; coconut trees with coconuts growing leading up to farm; about 5 papaya trees (2 are growing fruit); lots of rows of young corn (no fruit yet) ; coconut and banana trees scattered throughout ; tomato plants have fruit; eggplants have fruit ; dill plants?; mustard greens	
Light	most plants exposed to direct sunlight (corn, papaya, chilis); other plants have a roof over them (leafy vegetables and cabbage)	

Others	solar panels - not sure if they are used on the farm	
Fertilizers		
Type of fertilizer	bag of fertilizer spotted, unsure of what kind; traces of the rice ashes	

Appendix F - Interview with farmers under the Kham Koon Center

Interview Questions for Kham Koon Farmers

Introduction to inform the farmers about the project before the interview:

The team is doing a project with a learning center in Northern Thailand called Kham Koon Center. Our project sponsor is Dr. Tantip Thamrongvarangoon MD., the founder of the Sustainable Community Development Foundation, a nonprofit organization that focuses on tackling issues throughout their community. Kham Koon Center currently has a partnership with the Ubonrat Community Hospital, they provide produce to the hospital kitchen and sell it to the local community members. Kham Koon center is looking forward to expanding its customer base and providing them with a safer consumption choice to improve the overall health of the community. Kham Koon Center is looking to help its farmers obtain GAP certification and improve the overall health of the community through improving farming practices. Our goal is to help them to become GAP certified and collaborate with the community to improve farming practices for the benefit of human health.

The interviews were recorded using a password-protected smartphone and uploaded into a shared Google Drive Folder. Only the subject's voices were recorded. The following questions were asked to the farmers during the scheduled visits to the 10 farms.

For Uncertified Farms

1. What motivates you to become organically certified?
2. Have you ever tried to apply for an organically certified process? If so, why did it fail?

For Certified Farms

1. What are some difficulties and challenges you face while applying for the organic certification? How did you resolve or overcome these issues?
2. What difference has the organic certification made in the amount of produce?
3. Did you have to get any more equipment or more expensive resources to become organically certified? If so, what kinds?
4. Did you have to change where you buy seeds, fertilizers, pesticides, and other resources when changing to be certified? Why or why not?

General Question

1. In the past, have you ever used any chemical in any farming practice?
2. Do you have any plan of expanding the farm or improving any facilities in your farm? (storage, farming process, produce, etc.)

Seeds

3. Where did you get the seeds from and why?
4. Is there a way to make sure that the seeds are organic
5. How much more expensive is are organic seeds versus non organic seeds

Soil and Water

6. Do you have any methods to maintain the quality of soil and water, if yes, how do you do it?
7. Where is the source of water that is used in the farm?
8. How can you make sure that the water is clean and safe for farming

Mineral and quality of soil

9. What kind of fertilizer do you use
10. Do you use animal manure to fertilize? If so, why do you use it and where does it come from? Do you know if it comes from a place that uses a lot of chemicals

Pesticides and Plant diseases

11. How do you protect the farm from pesticides and plant disease? Please specify
12. Do you have any pest prevention methods?
13. Do you utilize any plants to keep pests away, and if so, which ones?
14. Have you ever used chemical fertilizers or any type of chemical pesticides? If so, why did you have to use these and when was the last time you used them?
15. If you use chemical pesticides, how much do these usually cost?

Livestock

16. Do you have any livestock, what are they?
17. Are the current livestock healthy and in good condition? Why/ why not?
18. What is the source of your animal feed and why?
19. Do you use organic food for feeding the livestock? Why or why not?
20. Do you use their manure as a fertilizer? What kinds and why?
21. Is there any chemical use (hexoestrol, other growth hormones) in livestock? Why or why not?
22. How do you cure the animal when they're ill? Why?

Employee

23. Do you have any outsource employment? How much do you pay them?

24. What is the outsource employment responsibility on the farm? (All the work or do you allocate roles/responsibilities for them)

Marketing

25. Who do you send your products to and why? (sell on your own at the local market, organic market, to the sellers, exports)
26. Do you support the farm in expanding who it sells to in order to bring in more money?
27. Do you have your own plan to increase your sales or market your products? What is the strategy and why?
28. Is there an issue with the overuse of pesticides for most farms in this area? Why or why not?

Product Management, storage, and transportation

29. What do you use to package and transport the products?
30. Where do the production processes(packaging and storage) take place?
31. Do you follow any hygiene requirements for the container used?
32. Is there a clear separation between organic materials and normal ones?
33. Do you record all the production processes? species and quantity? harvesting, packaging, and distributing day?
34. How much produce can you usually harvest at a time?
35. What time of year do you usually harvest?
36. Does your plot produce an adequate amount of crops per week for all customers?
Why and why not?

The table below is to fill in the varieties of produce they could harvest in a year

Name of the farmer:

<i>Months</i>	<i>Varieties of crops</i>
<i>January</i>	
<i>February</i>	
<i>March</i>	
<i>May</i>	
<i>June</i>	
<i>July</i>	
<i>August</i>	
<i>September</i>	
<i>October</i>	
<i>November</i>	
<i>December</i>	

Appendix G - Farmer Interview Answers

Certified Farmer

1. นางอุรา ศรีวัตร

General Information

- Has a total of 41 acres (inherited from mother)
- Has 3 workers (grandmother husband and son)
- Used chemicals in her farm before she met the doctor.
- Did an experiment to compare non-chemical and chemical vegetables, the non-chemical one stayed fresh for a week but the chemical one withered within one day outside the refrigerator. The products reduced by 80% when not using chemicals
- Increase her savings, decrease debt, and better health
- Problem: sometimes, she could not visit the farm very often
- Very few local members are doing the similar activities but they have too little information and knowledge.
- Problem: Wants to increase their income but needs to find more customer
- Planning to make an agreement with another foundation but needs to see the market first (if they can sell more she will expand the farm)

Seeds

- Get seeds from friends' store

Water

- Use groundwater
- Keep the water in a pond and pump it up to the tank for the water to precipitate and then use it for watering plants

Fertilizers

- Use Dormite (made from rice no chemical) to prepare the soil

- Mixture: cows chicken + bio extract (manure from the neighbor)

Livestock

- 10 chickens
- Feed with leftover vegetable + rice bran
- Let them grow naturally
- Sell duck eggs

Products Management

- Use tractor to shovel the soil
- Not much pesticides and insects but she uses the biochemical solution to lure the insects away from the plant. (Put the solution on a future board and stick it into the ground)

Future Plan

- Wants to expand her farm and have more income
- If there is more demand, she believes she can serve the demand

Opinion and experience after the change

- Happy to sell organic vegetables to people and supports the good health of local people
- Proud to be organic farm
- So glad that she has profited by doing organic farm

Uncertified Farms 1 นาง สุนันท์ จำเภา

General Information

- Has a total of 36 acres but wants to certify only 2 acres
- Has 2 workers
- Used chemical fertilizer before she met the doctor.

Seeds

- Use low price seeds from Jia Tai brand

Water

- Use rainwater stored in the natural pond; no solar cells so could not pump up a lot of water to use
- Use electricity to pump the water up to the tank for the water to precipitate and then use it for watering plants

Soil and Fertilizers

- Manure fertilizer and fermented fertilizer (made from rice bran, rice chaff, molasses, and microorganism)
- Use Dormite (made from rice no chemical) to prepare the soil
- Problem: mold on banana trees because she used raw manure for fertilization

Livestocks

- 6 buffalos
- Let them walk on the field and feed on natural grass
- Take a bath in the pond by themselves
- Vaccinated

Product Management

- Use Glycoderma (microorganism to prevent plant disease) to adjust the soil (hospital provided)
- Not much pesticides and insects but she uses the biochemical solution to lure the insects away from the plant. (Put the solution on a future board and stick it into the ground)

Future plan

- She can expand to an extent (that does not exceed her work capacity)

Opinion and experience after the change

- Happy to sell organic vegetables to people and supports the good health of local people
- Proud to be organic farm
- So glad that she has profited by doing organic farm
- Earn a lot of profit
- Her corn is the best sellers

Uncertified Farms 2 ทองแถม ทองโคตร

General Information

- 1 labor, no help from her family
- Total of 9 acres
- The land is under her granddaughter's land
- Never uses chemical on any of her plants apart from the sugarcane which is on the opposite side of her farm plot
- Has no idea what the certification is

Seeds

- Initially, she bought the seeds from the store to grow her sprout. Later on, she uses the seed from her produce to grow new sprouts

Water

- Uses underground water

Fertilizers

- Uses cow manure from her own cows that were recently sold out.
- Bought some animal manure from her neighbor at the price of 100 bahts per 3 packages

Pesticides and plant disease

- Has flies around the mango trees
- Uses a herbal formula to lure the insect away from the plant
- Plant her sprouts in the pot first to prevent ants insects from feeding on the roots

Product Management

- Harvested and store in a basket before washing and packing the produce into plastic bags
- Sells her products to the hospital, market sellers and neighbors.
- Uses bicycles to transport her produce to her customers
- The hospital comes to the farm to collect the produce every week
- Never records farm activities
- Keeps a portion of produce for own consumption

Future Plan

- No plan to expand and does not have the capacity to do so on her own
- She paid off all the debt and was able to save up her income

Uncertified Farms 3 นางกุลณี หนองไยธา

General Information

- Has a total of 38 acres but wants to certify 5 acres
- Has 2 labors
- To prevent pesticides, she burns neem leaves and uses bio extracts
- Never uses chemicals
- Living
 - Not profitable

- Not enough money for living
- Nearby plots
 - Her son's plot use chemicals
 - Made a soil slope, so the chemicals do not go into her plot

Seeds

- Buy from the market nearby, 25 Thai baht each

Water

- Use groundwater
- Has water tank to reduce the acid and base in the water in order to maintain the pH

Fertilizers

- Use pig manure

Livestocks

- 20 chickens
- Feed them with bananas and chicken feed
- Use straw in the chicken cage

Product Management

- Does not record the production
- Prefer to sell at the Klong Thom market because it gains more profit
- Hospitals determine what they want, except eggs and bananas, she can sell as much as she wants. She can sell 4 egg pecks per week for 100 baht per pack.

Future plan

- If there is more demand, she believes she can serve the demand.

Opinion and experience after change

- More healthy in physical and emotional health
- Happy and proud of herself

- After being organic, she can sell more and get more income.

Uncertified Farms 4 นางทองคำ มณีสา

General Information

- Has ¼ acres
- Has 1 laborer which is herself
- She plants cantonese and spring onion
- No one comes to check up
- There are no insects or not much which can not notice
- Sell in front of the house and hospital
- Income
 - Enough for water and electricity bills
 - Additional work outside

Seeds

- Buy from the local stores
- Coriander: get from leftover by eat it and the leftover use to plant it

Water

- Use tap water

Fertilizer

- Mixture of Black husk, chicken and pig manure, rotten wood and burn rice
- Buy manure from friends and from the buffalo farm

Products Management

- Do not record
- Plant for household eating
- Collect the products by hands and then distribute to the hospital

Future plan

- No plan to expand and do not have capacity to do so on her own

Opinion and experience after change

- Enough money for daily life
- Happy and proud to produce a healthy products

Uncertified Farms 5 นาง บุญจันทร์ ห้วยจันทร์**General Information**

- Has 28 acres
- Has 1 laborer which is herself
- Plant lots of vegetable types in the same plots
- Plant the big tree to keep the water during drought season
- She used to use chemicals
- Problem: Products are not ready for the inspection
- Pick the insects by hand
- To prevent the insects, she use a mixture of alcohol and vinegar and use ash water
- Income in enough for daily life

Seeds

- Buy from local stores “ศรีแดง”(Sorn Deang)

Water

- Use groundwater

Fertilizer

- Use buffaloes manure, cows manure, and pigs manure
- Buy from friends

Livestock

- 3 buffaloes
- 2 cows
- Feed them with grass and straw
- Wash the cage sometimes

Products management

- Record
- Collect by hands
- Wash and then distribute to the hospital

Future plan

- If there is more demand, she believes she can serve the demand.

Opinion and experience after change

- Do not want to use chemicals
- Reduce debt after doing organic farm
- Healthier lifestyle

Uncertified Farms 6 นาง พัน ชมพูน

General Information

- Has 20 acres
- Mainly works by herself, sometimes her husband helps
- Problems
 - Flood results in the produce reduction from 30 tons to 15 tons
 - Dog bite the ducks, therefore, she is planning on putting up a fence

Water

- Use rainwater stored in the natural pond
- Enough for usage

Fertilizers

- Use manure fertilizer which is a mixture of chicken and cow manure

Livestocks

- 80 Chickens
 - Walk all over the place
 - Never give the nutrient to chicken
 - Feed them with bananas, rice, or chicken feed
 - She can sell the egg every day to the hospital and nearby farmers
- 50 Ducks
 - Feed them with bananas, rice, and chicken feed
 - Lay eggs every 5 months
- The Department of livestock development provides medicine and bio-fermented water.
- There are natural fish in the pond, so she takes some of them to sell.
- She doesn't clean the corral only sprays disinfectant in the chicken corral that is given by the department of livestock development

Product Management

- No insects that harm the plantation and livestock
- Send banana, mushroom, and duck eggs to the hospital
- Mushrooms sell for 7 baht per chunk
 - The mushroom field is in the chicken corral
- She can sell a lot of banana and lime
- Weave silk around 3-4 kg and sell to a silk organization in Khon Kaen

Opinion and experience after change

- Happy with the good farming practices

- Her income is enough for basic daily use

Uncertified Farms 7 นาง จำเริญ รสเริง

General Information

- Has 6 acres
- Has 2 workers which consist of herself and her husband
- The doctor suggests she start organic and sustainable farming and apply for the organic certificate. She went to several orientations with the doctor, and the hospital does not allow her to use chemicals.
- Traceability System
 - She records her harvest, especially those that are sent to the hospitals
- Income = sufficient
 - 250 baht per week
 - She had debt before but now she paid it all and she now has some saving

Seeds and Sprouts

- Buy the sprout from the internet which says that they don't use any chemical

Water and Electricity

- Use electricity to pump the water up to the tank for the water to precipitate and then use it for watering plants
- She has a solar cell on her farm

Fertilizers

- Use manual fertilizer
 - Use burnt paddy (2 bags) and manual fertilizer to improve soil conditions
 - Should not use too many fertilizers because the soil will be salty and the plants will die

Livestocks

- 9 cows
 - Feed with cassava, grass, rice bran
 - Raise as a fund
- 22 domestic fowl
 - Feed with rice bran, rice
- Clean the enclosure space when it is dirty
- There is spray disinfectant that she buys to clean the cow corral

Product Management

- Collect produce by hand and basket, and then place everything in plastic bags. After that, measure the weight (kg) and send it to the hospital
- Want certificate for eggplant and chili
- 1 plot has many types of vegetables (mixed planting)
 - Benefits: save spaces, labor
- Cabbage is sold at 20 baht and 30 baht in the market and chili is very popular
- Sell to the nearby houses and hospital and keep some to eat
- To prevent insects, use rice ashes mix with water and use alcohol and vinegar mixture spray every week

Future Plan

- She wants to and will be willing to expand her farm
- If there is more demand, she believes she can serve the demand.

Opinion and experience after change

- Very proud of herself

Uncertified Farms 8 นายกิมไ้ หมู่เที่ยง

General Information

- Has a total of 22 acres but want to certify only a few acres
- Consists of 1 farmer which is himself
- He sells and wants to certify kales, Cantonese and chili
- He has dogs walking around the farm

Seeds

- Buy seeds from the local store

Water

- Use water from the pond for watering plants

Fertilizers

- Manure fertilizer
 - Use chicken manure on his farm, bio extract and sometimes pig manure fertilizer from the market

Livestock

- He has 20 chicks, 3 hens and 1 rooster
- There are fishes in the pond

Product Management

- There are worms in vegetables
- Do nothing with the pest and insects, just let them be there without removing them, and if the plant is rotten, he will remove it.
- He used to use plant hormones on the farm, and he said that the product is better without chemicals.
- He plants and eats his produce and sent some for selling
 - Sells vegetables and limes to hospitals and local market

- Used to sell chili to hospitals, but stop planting them due to the Anthracnose
- No record

Future plan

- He wants to and is working toward expansion of the plot and increasing sales.
- If there is more demand, he believes he can serve the demand.

Opinion and experience after change

- He got no profits from this, but it is enough for basic daily uses
- Happy to eat what he grew

Uncertified Farms 9 นางทองเลื่อน ผาจวง

General Information

- Has a total of 11 acres, but wants to certify only 5 acres
- Has 2 farmers consisting of her husband and herself
- Never use any chemicals on the farm

Seeds

- She gets seeds from friends' store

Water

- From Ubonrat dam (100 bahts/hour, share with 3-4 friends)
- No groundwater around the farm

Fertilizers

- Use manure fertilizer and fermented fertilizer
 - Mixture: cow manure, duck manure chicken manure and bio extract
 - She raises duck and chicken and uses their manure, except the cows because the cow belongs to her siblings
 - Get biochemical to lure the insect away from the plant

Livestocks

- She has 9 ducks and 10 chickens
- She feed with leftover vegetable and rice bran
- Let them grow naturally

Product Management

- After collecting vegetables, she washes them with clean water twice before distributing the produce.
- She removes the insects by picking up the insects
- She records the planting and harvesting dates in her notebook
- She sells the produce to the hospital, Pid Thong foundation, and the local market at Khon Kaen
- She picks out the insect from the produces

Future plan

- She wants to expand her farm, and gain more income
- If there is more demand, she believes that she can serve the demand

Opinion and experience after change

- She feels happy to sell organic vegetables to people and supports the good health of local people
- She proud and glad that she gain a profit from doing an organic farm

Appendix H - KAP (Knowledge, Attitudes, and Practices) Survey

Exclusion Criteria: The study will exclude any children, senior citizens, or disabled persons who do not purchase their own groceries.

Risk Mitigation: Subjects may skip any question they do not wish to answer and/or may withdraw consent from the study at any time without repercussion. Confidentiality risk mitigation will be addressed in the IRB application.

Statistics: The team plans to analyze the data collected to gain a better understanding of Kham Koon Center farmers' current farm practices. This may include graphics, statistics, or charts to better display the data.

Questions will be given after the presentation about the GAP process, showing the infographics, and the information on traceability.

Listed below are the survey questions:

[ตรวจสอบความเข้าใจของเกษตรกร]

[กรุณาวางกลมข้อที่ตรงกับท่านที่สุดเพียงข้อเดียว]

Knowledge Questions (Check yes or no) [คำถามสอบถามเรื่องความรู้]

1. I know the difference between organic and non-organic fertilizers [ฉันรู้ความแตกต่างระหว่างปุ๋ยเคมีและปุ๋ยอินทรีย์]

a. Yes [ใช่]

b. No [ไม่ใช่]

2. I know the difference between a contaminated and not-contaminated water source [ฉันรู้ความแตกต่างระหว่างแหล่งน้ำที่มีสารเคมีและแหล่งน้ำธรรมชาติที่ไม่มีสารเคมีเจือปน]

a. Yes [ใช่]

b. No [ไม่ใช่]

3. I know where to source safe seeds [ฉันรู้ว่าจะจัดหาเมล็ดพันธุ์ที่ปลอดภัยได้จากที่ใด]

a. Yes [ใช่]

b. No [ไม่ใช่]

4. I know which pesticides are safe to use [ฉันรู้ว่ายาฆ่าแมลงชนิดใดปลอดภัยที่จะใช้]

a. Yes [ใช่]

b. No [ไม่ใช่]

5. I know how to become GAP certified [ฉันรู้วิธีที่จะได้รับการรับรอง GAP]

a. Yes [ใช่]

b. No [ไม่ใช่]

Attitude Questions (what is believed?) (Check yes or no) [คำถามสอบถามเรื่องทัศนคติ]

1. I believe that it is important to use pesticides properly. [ฉันเชื่อว่าการใช้ยาฆ่าแมลงอย่างถูกต้องและปลอดภัยเป็นเรื่องที่สำคัญ]

a. Yes [ใช่]

b. No [ไม่ใช่]

2. I believe that it is important to reduce the use of chemicals for the health of the community. [ฉันเชื่อว่าการลดการใช้สารเคมีเป็นสิ่งสำคัญต่อสุขภาพของชุมชน]

a. Yes [ใช่]

b. No [ไม่ใช่]

3. I believe it is too difficult to stop using pesticides completely. [ฉันเชื่อว่ามันเป็นสิ่งที่ยากเกินไปในการหยุดใช้ยาฆ่าแมลงแบบถาวร/อย่างสิ้นเชิง]

a. Yes [ใช่]

b. No [ไม่ใช่]

4. I would be willing to try to get the GAP certification in the future. [ฉันยินดีที่จะยื่นขอ

ใบรับรอง GAP ในอนาคต]

a. Yes [ใช่]

b. No [ไม่ใช่]

5. I would be willing to learn more about improving my farming practices. [ฉันยินดีที่จะ

เรียนรู้เพิ่มเติมเกี่ยวกับการพัฒนาและปรับปรุงการปฏิบัติในฟาร์มของฉัน]

a. Yes [ใช่]

b. No [ไม่ใช่]

Practice Questions (what is done?) (Check yes or no) [คำถามสอบถามเรื่องการปฏิบัติ]

1. I use pesticides when growing my crops. [ฉันใช้ยาฆ่าแมลงในการปลูกพืชผล]

a. Yes [ใช่]

b. No [ไม่ใช่]

2. I read the pesticide labels and always follow instructions about how to use them.

[ฉันอ่านฉลากยาฆ่าแมลงและปฏิบัติตามคำแนะนำเกี่ยวกับวิธีใช้ทุกครั้ง]

a. Yes [ใช่]

b. No [ไม่ใช่]

3. I do not mix more than 2 types of pesticides. [ฉันไม่ได้ผสมหรือใช้ยาฆ่าแมลงมากกว่า 2

ชนิด]

a. Yes [ใช่]

b. No [ไม่ใช่]

4. I have tried using pest management methods before using pesticides. [ฉันเคยทดลองใช้

วิธีการจัดการป้องกันแมลงก่อนที่จะใช้ยาฆ่าแมลง]

a. Yes [ใช่]

b. No [ไม่ใช่]

5. I make a list of the pesticides I use on each crop. [ฉันจดบันทึกยาฆ่าแมลงที่ฉันใช้ในแต่ละแปลง]

a. Yes [ใช่]

b. No [ไม่ใช่]

6. I use protective clothes such as gloves, hats, and masks when spraying pesticides. [ฉันสวมเครื่องมือป้องกันเช่น ถุงมือ หมวก และหน้ากากอนามัยเวลาฉีดยาฆ่าแมลง]

a. Yes [ใช่]

b. No [ไม่ใช่]

7. I have access to a first aid kit in case of emergency. [ฉันสามารถเข้าถึงชุดปฐมพยาบาลในกรณีฉุกเฉินได้]

a. Yes [ใช่]

b. No [ไม่ใช่]

8. I have an irrigation system in place. [ฉันมีระบบรดน้ำในแปลงของฉัน]

a. Yes [ใช่]

b. No [ไม่ใช่]

9. I have access to clean, non-contaminated water. [ฉันสามารถเข้าถึงแหล่งน้ำสะอาดที่ไม่มีสารเคมีเจือปน]

a. Yes [ใช่]

b. No [ไม่ใช่]

10. I stop spraying pesticides at least 2 weeks before they are harvested. [ฉันหยุดใช้ยาฆ่าแมลงอย่างน้อย 2 อาทิตย์ก่อนเวลาเก็บเกี่ยว]

a. Yes [ใช่]

b. No [ไม่ใช่]

11. I use appropriate fertilizers for the crops I am planting. [ฉันใช้ปุ๋ยที่เหมาะสมกับพืชที่ฉัน
ปลูก]

a. Yes [ใช่]

b. No [ไม่ใช่]

12. I have a way to record when the crops are grown and how much. [ฉันมีวิธีการจดบันทึก
วันที่ปลูกและระยะเวลาที่ใช้ในการปลูกพืช]

a. Yes [ใช่]

b. No [ไม่ใช่]

13. The planting area is not close to another area that uses chemicals. [พื้นที่ปลูกอยู่ห่าง
จากสภาพแวดล้อมที่มีสารเคมี]

a. Yes [ใช่]

b. No [ไม่ใช่]

14. I regularly check my tools and equipment to prevent accidents. [ฉันตรวจสอบเครื่องมือ
และอุปกรณ์อย่างสม่ำเสมอเพื่อป้องกันอุบัติเหตุ]

a. Yes [ใช่]

b. No [ไม่ใช่]

15. I regularly clean my tools and equipment. [ฉันทำความสะอาดเครื่องมือและอุปกรณ์อย่าง
สม่ำเสมอ]

a. Yes [ใช่]

b. No [ไม่ใช่]

16. I sort through the qualified and unqualified produce when it is harvested. [เมื่อเก็บ
เกี่ยวฉันคัดแยกผลผลิตที่มีคุณภาพและไม่มีคุณภาพ]

a. Yes [ใช่]

b. No [ไม่ใช่]

17. Harvested produce is not placed directly on the ground. [ผลผลิตที่เก็บเกี่ยวแล้วไม่ได้วางบนพื้นโดยตรง]

a. Yes [ใช่]

b. No [ไม่ใช่]

18. I have a place for storing and packing the produce. [ฉันมีพื้นที่จัดเก็บและบรรจุสินค้า]

a. Yes [ใช่]

b. No [ไม่ใช่]

19. I have a space for the storage of equipment and containers. [ฉันมีพื้นที่สำหรับจัดเก็บอุปกรณ์และภาชนะต่างๆ]

a. Yes [ใช่]

b. No [ไม่ใช่]

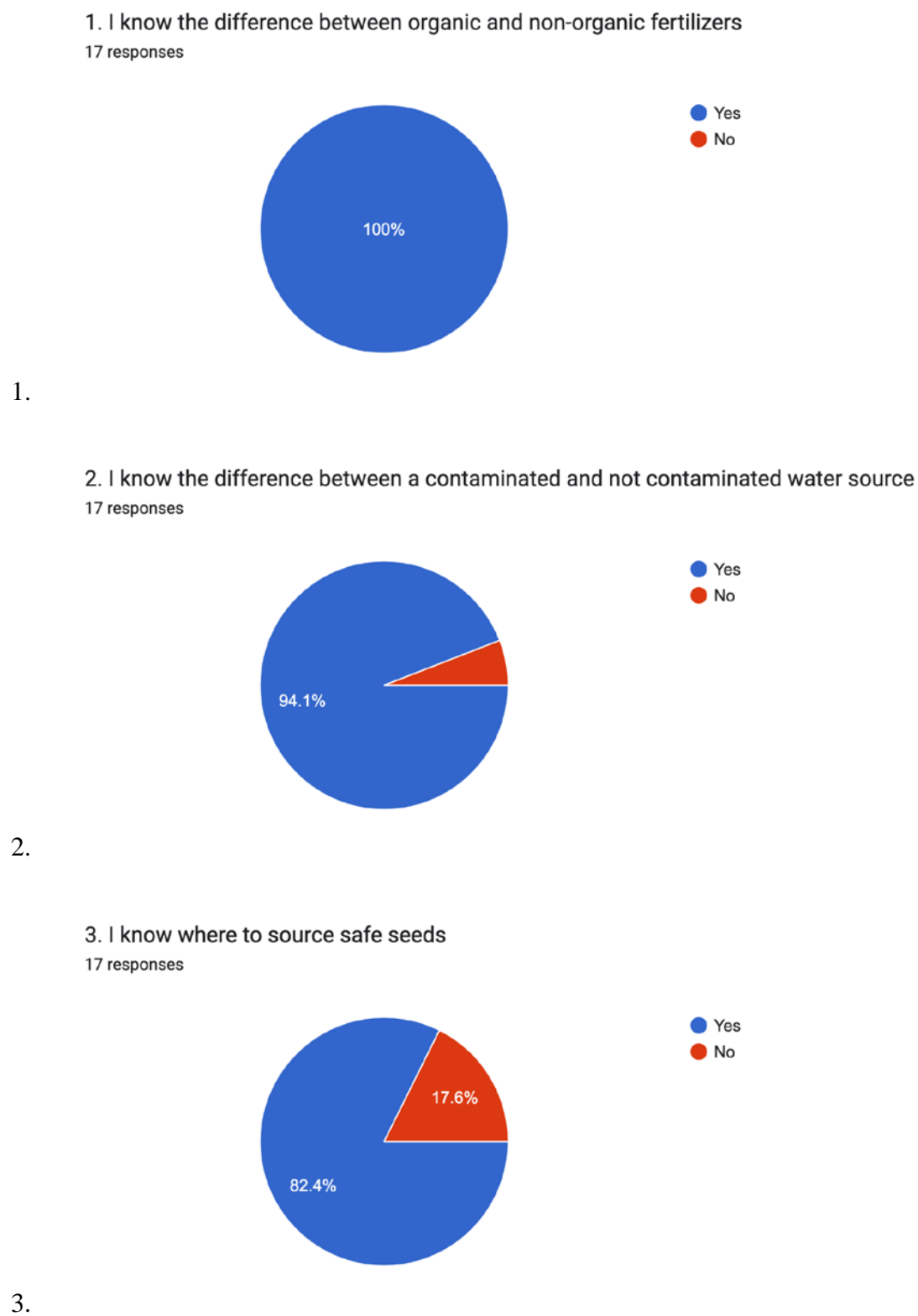
20. I have the ability to gain the GAP certification right now. [ตอนนี้ฉันสามารถได้รับการรับรอง GAP]

a. Yes [ใช่]

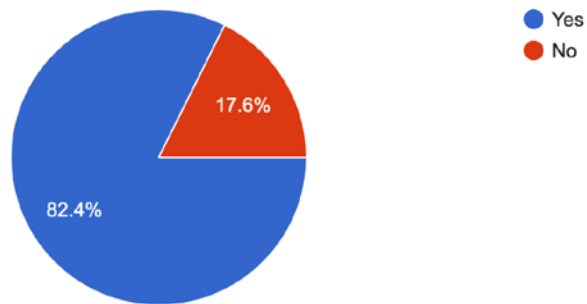
b. No [ไม่ใช่]

Appendix I - KAP Survey Results

Knowledge Questions

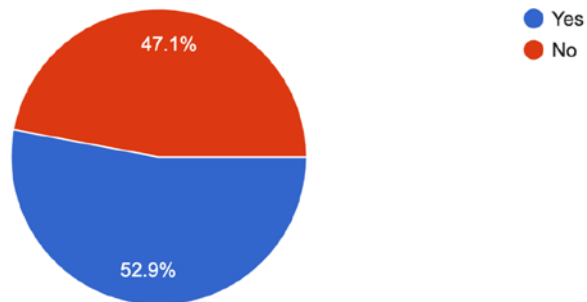


4. I know which pesticides are safe to use
17 responses



4.

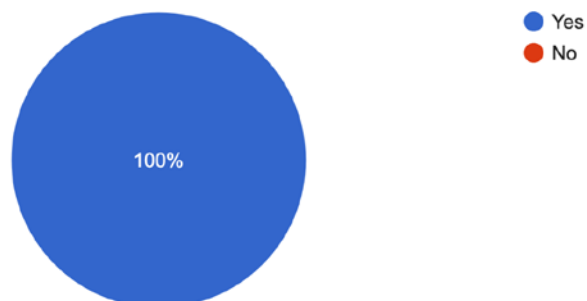
5. I know how to become GAP certified
17 responses



5.

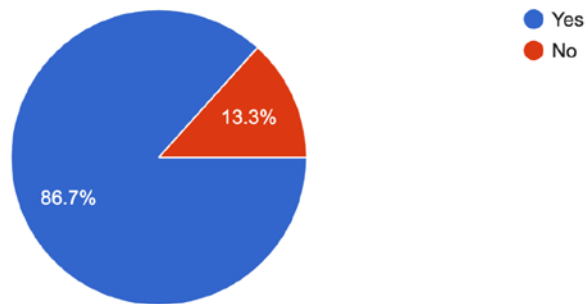
Attitudes Questions

1. I believe that it is important to use pesticides properly.
17 responses



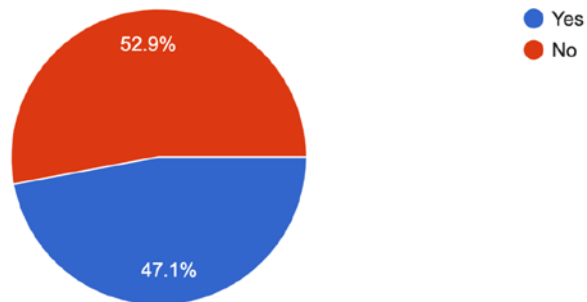
6.

2. I believe that it is important to reduce the use of chemicals for the health of the community.
15 responses



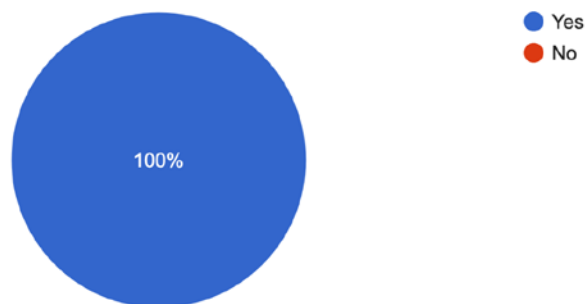
7.

3. I believe it is too difficult to stop using pesticides completely.
17 responses



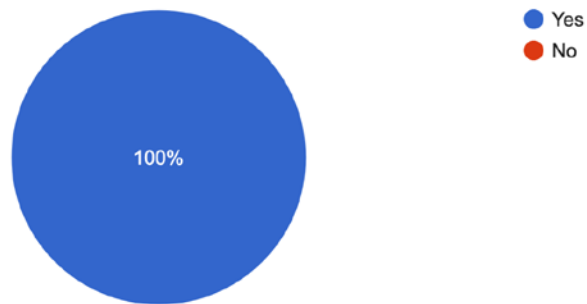
8.

4. I would be willing to try to get the GAP certification in the future.
17 responses



9.

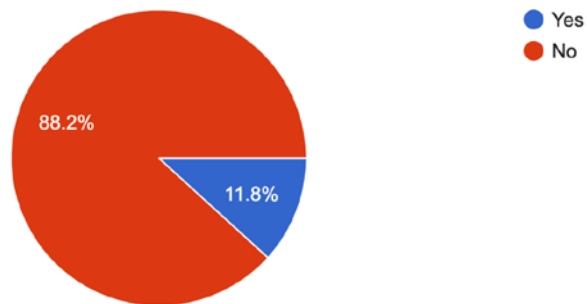
5. I would be willing to learn more about improving my farming practices
17 responses



10.

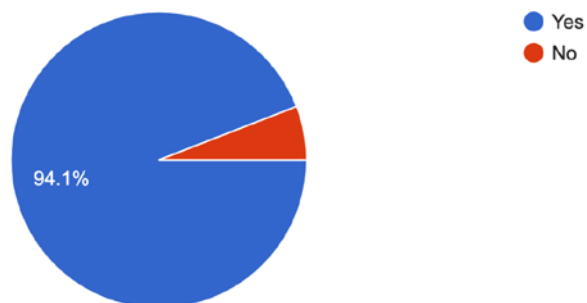
Practices Questions

1. I use pesticides when growing my crops
17 responses



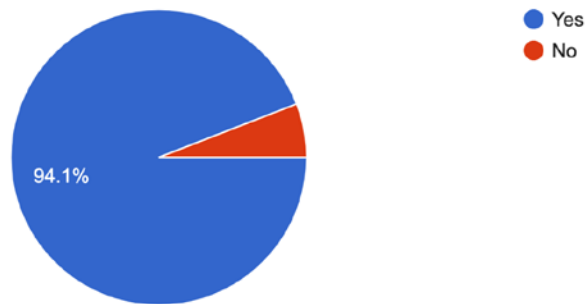
11.

2. I read the pesticide labels and always follow instructions about how to use them
17 responses



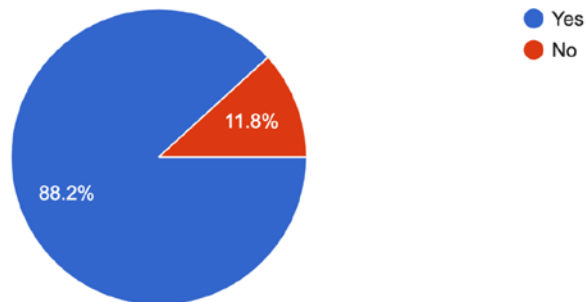
12.

3. I do not mix more than 2 types of pesticides
17 responses



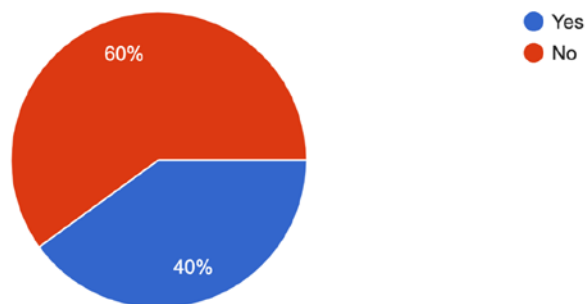
13.

4. I have tried using pest management methods before using pesticides
17 responses



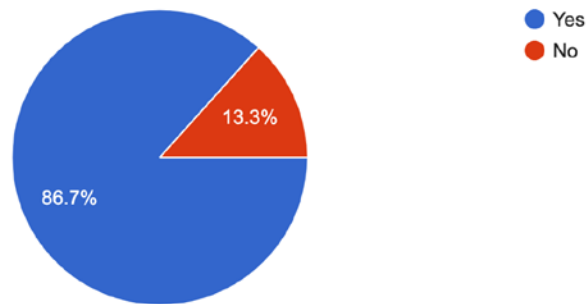
14.

5. I make a list of the pesticides I use on each crop
15 responses



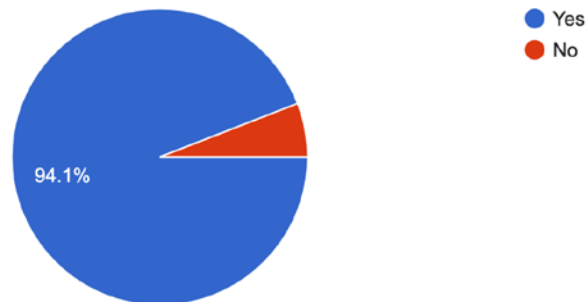
15.

6. I use protective clothes such as gloves, hats, and masks when spraying pesticides
15 responses



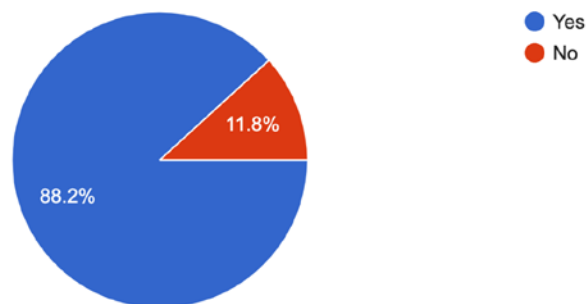
16.

7. I have access to a first aid kit in case of emergency
17 responses



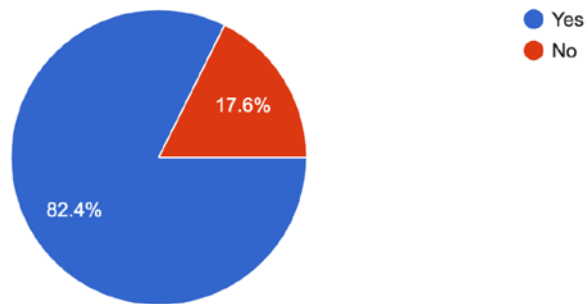
17.

8. I have an irrigation system in place
17 responses



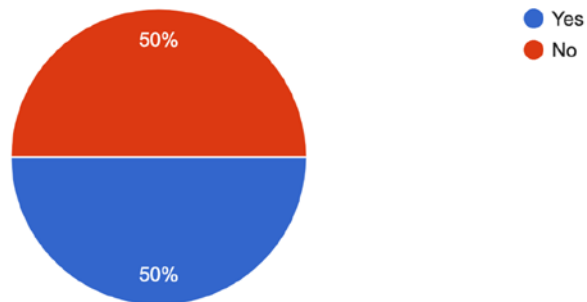
18.

9. I have access to clean, non-contaminated water
17 responses



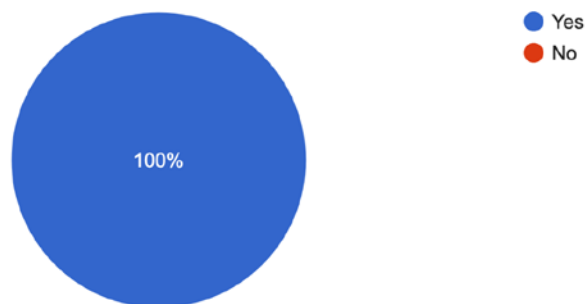
19.

10. I stop spraying pesticides at least 2 weeks before they are harvested
14 responses



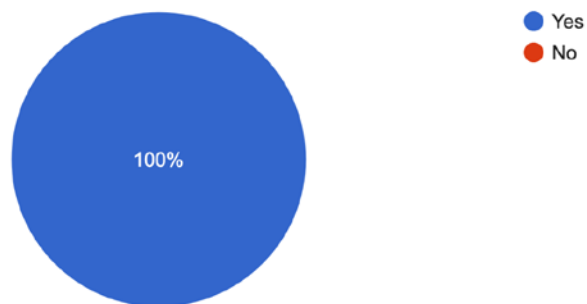
20.

11. I use appropriate fertilizers for the crops I am planting
17 responses



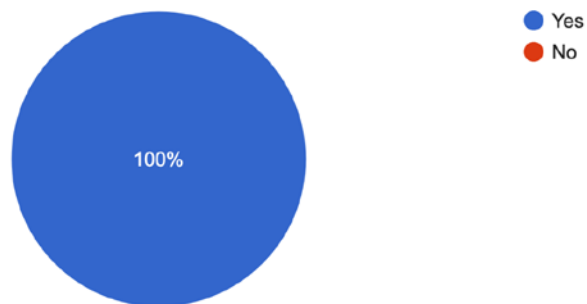
21.

12. I have a way to record when the crops are grown and how much
17 responses



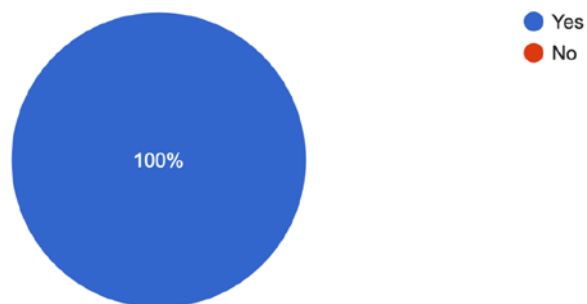
22.

13. The planting area is not close to another area that uses chemicals
17 responses



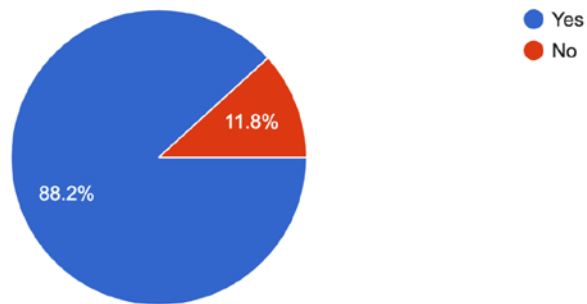
23.

14. I regularly check my tools and equipment to prevent accidents
17 responses



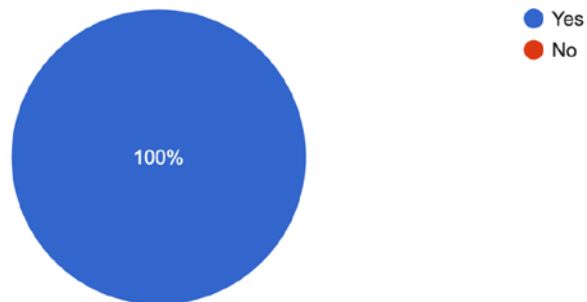
24.

15. I regularly clean my tools and equipment
17 responses



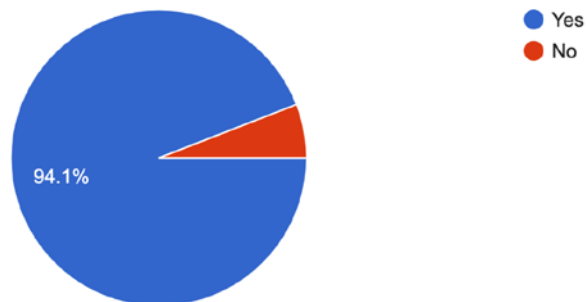
25.

16. I sort through the qualified and unqualified produce when it is harvested
17 responses



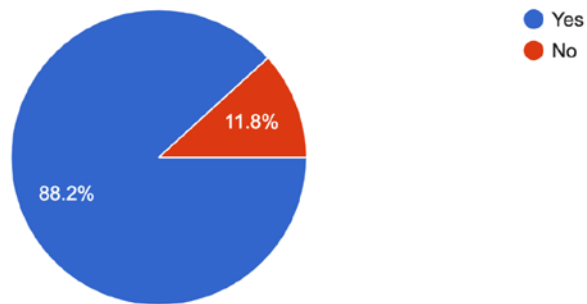
26.

17. Harvested produce is not placed directly on the ground
17 responses



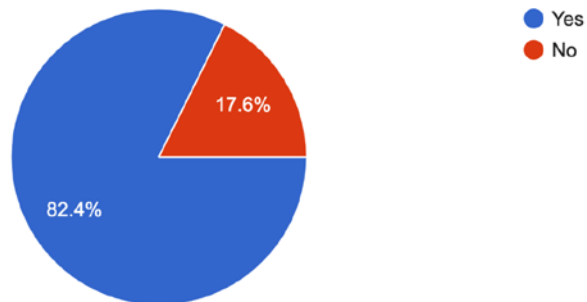
27.

18. I have a place for storage and packing for the produce
17 responses



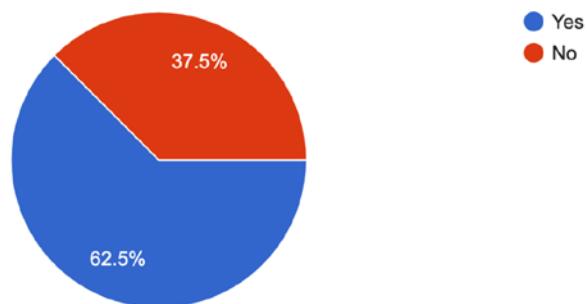
28.

19. I have a space for storage of equipment and containers
17 responses



29.

20. I have the ability to gain the GAP certification right now
16 responses



30.

Appendix J - Interview with Operator of SAFETist Farm, Bangkok

Introduction to inform the operator about the project before the interview

The team is doing a project with a learning center in Northern Thailand called Kham Koon Center. Our project sponsor is Sustainable Community Development Foundation, a nonprofit organization that focuses on tackling issues throughout their community. Kham Koon Center currently has a partnership with the Ubonrat Community Hospital, in which they provide produces to the hospital kitchen and sell it to the local community members. Kham Koon Center is looking forward to expanding its customer base and providing them with a safer consumption choice to improve the community's overall health. To gain the customers' trust, Kham Koon center needs our help to have their products certified and develop an effective way to trace and recall their products. Our goal is to help them become certified and identify the best method to trace their development. The team have visited the SAFETist farm to ask for some suggestions and advice on how could improve the farms in Khon Kaen and use the SAFETist farm as an example.

Below are the questions the team asked along with summarized answers:

Topic: History of SAFETist Farm

Answer:

- The purpose of the SAFETist farm is to be a learning center and provide learning experiences for people in the community, especially children.
- Build the farm as a place where farmers can live and spend their daily life there
- At first, they had only a little knowledge about farming, so they learned from Youtube. Later on, they learn more from orientations through their network suggestions and most importantly, from real-hand experiences

- Mr. Thawatchai was an office worker but there were a lot of expenses so he decided to live on the farm and consume the food that he grew. He was able to save a lot of money.
- Farm structure
 - Have many activities and areas such as Bird Watching Tower, Movie Screen, Stages, Kayak Boat, Fishing area and Camping area
 - Want to add a workshop zone in the future

Topic: General Information

1. What do you grow?

Answer:

- Plant 3 types of vegetables in one plot so they can have as many varieties as possible to be distributed to their customers.
- They have a raised garden to prevent the vegetables from flooding. The raised platform also allows elderly people to plant without having to bend their back
 - i. The Bamboo platform has to be replaced after every 2 years and it costs 2000-3000 bahts (8 x 10 meters)
 - ii. For a more stable platform, they would prefer concrete, wood, and steel. However, the cost will be raised to 5000 bahts and above.
- They were funded by Nation-Building Institutes (NBI) for the construction of shelters and buildings
- Small sprout plot is placed in nets to prevent mice and birds -> received from donation, it costs around 500 baht per 100 meters

2. How large is the farm?

Answer:

- 2 acres
- They started off as a group of volunteers working for a community to develop the soil and pond areas in the Bang Mhod district. Later on, they form a team of 20 people with a plan to build the SAFETist farm.

3. How many employees do you have?

Answer:

- Currently has 5 people working on the farm. Each one of them has their own jobs allocated.

4. Who does your farm mainly sell to, and why?

Answer:

- Start off with planting for them to eat -> when there are more vegetables, they sold them to their members (around 13 people)
- Bangkok has higher sales than other provinces but other provinces' produce is of better quality in some seasons
 - i. Winter season = both product's quality are similar
 - ii. Summer and rainy season = other provinces' are better
- Monthly vegetable basket
 - Members from nearby areas and from connections
 - They deliver the basket themselves with the motorcycles and truck
 - They know all their customers. Also, have farm visits to build up the customers' trust
 - Cost of production: 500, 1000, 1800 baht per vegetable basket
 - Sell at 600, 1100, and 190. The price is more expensive than conventional produce

Event booths where they sell their vegetable

School comes for a field trip and do activities there

Cost for the eggs (chicken)

- iii. They cannot handle the cost of the production so they might sell the chicken away soon
- iv. Cost of production: 16 baht per 1 egg
- v. Sell: 7 baht per 1 egg

5. Are you planning to expand your market at all? Why or why not?

Answer:

- They don't have much production capacity, although they want to expand their production/market

6. How far is the farm from where you sell your products?

Answer:

- Customers are all within Bangkok area

7. What kind of transportation systems do you have in place for your products?

Answer:

- Send the produce every Saturday, Sunday, and Monday through their motorcycles and cars to the customer's houses
 - i. The shipping price is based on the distance

Topic: PGS Certification

1. Why do you want the PGS certification over other certifications?

Answer:

- PGS certification is their goal and they have kinda forgotten about it

2. Have you ever used chemical fertilizers or any type of pesticides? If yes, when was the last time chemical fertilizers or pesticides were used?

Answer:

- Use bio extract (fermented) to prevent the insects
 - i. Bio extract to prevent slug: [neem leaves + tobacco leaves + fermented shallots for 1 night + cashew nuts]

3. What are some of the regulations and standards you must comply with for the certification?

Answer:

- The 8 principles of GAP and no chemical used in the field
- The processes are all organic, with no use of chemical fertilizers and chemical pesticides.

4. What are some challenges you have faced while trying to get the PGS certification?
How have you overcome them?

Answer:

- Problem with getting certification
 - i. Struggle with clean storage for tools
 - ii. No fences but that can be easily fixed
 - iii. Since PGS is a group of farms getting certified together, they still struggle with gathering all the farms in Bangkok nearby to apply for the PGS.

5. What practices did you have to change for the certification?

Answer:

- Soil
 - Sample checkups by an organization

- Use mud to improve soil fertility condition
- Fermented soil with bio extract for 4-5 days before planting
- Coffee grounds and food waste were used to ferment the soil
- Use a machine to mix soil and fertilizer
- Water
 - Usually use tap water to water their plants
 - Pond water is salty
 - Can use in the rainy season although there is flooding in the area

6. What additional equipment did you need to get for the certification?

Answer:

- They produce their own bio extract to be used as fertilizers
 - Microbial water was produced by letting photosynthetic bacteria in the sun. The microbial water will add nitrogen which is a rich source of nutrients for vegetables to the soil. Moreover, these microorganisms also help to break down any particles in the solid and make it easier for the plant to absorb.
 - Stored in the tank
- Fermented soil is made of 2 parts of rice hulls mixed with cow manure.
 - Cow manure quality affects the soil quality
 - 20 kg cow manure sack/ 45 bahts
 - Ordered from a milking cow farm
- Basalt soil + effective microorganisms

7. Do you use different seeds, water, resources, or anything else for the certification, and why?

Answer:

- Buy from Jia-Tai (not organic)
- Planning to have their own seed production in the future

8. Do you utilize any plants to keep pests away? If so, which ones?

Answer:

- Yes, plant more vegetables, and let the insects eat some of them so that there will be some left for sale, instead of using pesticides.

9. In your opinion, is there a significant pesticide issue in Bangkok? Why?

Answer:

- The most common one = is the UREA fertilizer

10. In your opinion, is it crucial that consumers in Bangkok have better access to organic products?

Answer:

- Yes

Topic: Production and Storage

1. Do you record all the production processes? For example, the species and quantity, harvesting, packaging, and distributing day?

Answer:

- Record the production sometimes

2. Where do the production processes (packaging and storage) take place

Answer:

- Clean vegetables before packing them into plastic bags
- They want to improve from plastic bags to banana leaves but they don't have enough banana leaves

Appendix K - Interview with Representatives from World Vegetable Center

When: Tuesday, January 31st, 10am - 11am

Interviewers: Napatsorn Chadanutakul, Pakkarin Putpongphaew, Yavitha Siri-u-vithtaya, Surangkana Srichantamit, Sophia Islam, Sophia Mularoni, Theresa Rosato, & Joelis Velez Diaz

Interviewees: Two employees from the World Vegetable Center

- Ms. Somchit Pruangwitayakun - Vegetable Research and Training Officer
- Ms. Sopana Yule - entomologist (study of bugs)

Relevant info: They do work with Integrated Pest Management (IPM) (natural enemy, Pheromone trap, bio-control); vegetable grafting could help the farmer overcome soil-borne disease and some abiotic stress; organized the vegetable grafting training together with Kasesart University; demonstration on home gardens, seed kits, and cucurbit breeding program

1. Preliminary Interview Protocol Questions before the team begin:
 - a. Ask to record the meeting, but tell them the recording will be destroyed after the project is over
 - i. Answer: Yes
 - b. You can remain anonymous if you want and you can choose not to answer any question they do not want to answer
 - i. If the team quotes you, can the team use your name?
 1. Answer: Yes

- c. If you need to contact us in the future, here is one of our emails:
syislam@wpi.edu
 - d. Our team are planning for the interview to take about an hour
2. Talk about project a little:
- a. The team is trying to improve the farming practices in Khon Kaen at the Kham Koon Center. The farm plots there have a relationship where they sell to the hospital market, but they have an issue with extreme use or misuse of pesticides and other chemicals. Our goal is to identify efficient and effective procedures for the Kham Koon Farm to educate and encourage its farmers and consumers to adopt chemical-free practices in order to better the health of the community. The team wants to create a guide for them to gain the Good Agricultural Practices certification, and eventually the Participatory Guarantee System, along with just a general guide to good farming practices. The team wanted to gather more information on better farming practices that use less chemicals to recommend to the farmers.
3. Below are the questions the team asked along with summarized answers:
- Can you talk a little bit about your roles at the World Vegetable Center?
 - Somchit Pruangwitayakun
 - Planning officer
 - Focuses on vegetable research - grafting, data collection
 - Conducted a training course - International Vegetable Training Course (IVTC)
 - Conducted with Department of Agriculture (DOA)
 - They invite people throughout the world who work with vegetables to participate in this training

- Sopana Yule
 - Research specialist of entomology
 - Works on reducing pesticide use, test for biopesticide
 - IPM practices to reduce use of chemicals
 - Help team in Taiwan to organize training and gives lectures on IPM for IVTC
 - Working and training in Southeast Asia (Taiwan, Laos, and Cambodia)
- Can you explain more about IPM, what it is, its principles, and its role in organic farming practices?
 - They focus on commercial crops
 - Tried to do test on legumes
 - STDA development agency - organization of Thailand that develops the new technology that can help commercial products; helps control pests
 - They aim to make pesticides the farmers' last resort for pest control
 - Control agro photovoltaics (APV) to control pests
 - Also promote the trap crop method - planting additional crops not intended for consumption along with main crops; they are targeted by pests instead of the cash crops; tried to use it to attract pests from main crops and then the farmer can spray the insecticides on the trap crop and not on the main crop
 - When they tried to introduce it they had to think about low input
 - Trap crops should not be 10-20% more than the main land and should not be too high in cost
 - Study of a test in India - mustard seed used to attract pests

- What are the most common pests that usually infect vegetables and fruits?
 - Bok choy or leafy brassica
 - Some crops have very short period for the growing period
 - Sometimes farmers have no choice but to spray
 - Biopesticides are available but cannot guarantee the quality of the crop - they try to help farmers screen and select the best biopesticides to promote to the farmer
 - Sometimes recommend nematodes used to control pests
 - Farmers can try to use a lot of different products to replace pesticides
- How do you screen and select the best pesticides? What is the criteria?
 - Start by looking at government information about pesticides and then compare the chemicals
- How much pesticide and insecticide can a farmer use on their crops before it becomes dangerous or toxic?
 - Suggest farmer to stop spraying 1-2 weeks before harvest
 - Need to read the instructions and efficiency intervals on the package
 - Try to search for the information from the government
 - Example: long bean
 - Papaya salad has raw long bean, so this is a very common vegetable for Thai people to consume
 - Long bean farmers believe if they spray the pesticide right before they harvest they can make the product better and more firm/durable
- What are the easiest ways to promote proper pesticide use/ what actions will have the largest health impact?

- Trainings - try to teach them about the insect/pest first and then they can choose the right practice to control them
- Farmers need to understand what they are going to kill in their fields
- Most farmers do not know about the major pests for the typical crop, so they need to understand clearly (good vs. bad insects)
- Changing the behavior of farmers is very hard work to do especially in this area because some farmers spread a lot of chemicals, mix them, and even spray once a week
- In some areas you can even smell the chemicals in the air because farmers spray so much
- Training information
 - IVTC and Farmer group growing vegetable
 - Conducted interviews about the problem in the field
 - Farmer fiscal - good technique to let the farmer see the result
 - Select one farmer who wants to know about it and change to serve as an example; teach them how to fix the problem and how to control it - one successful experiment in the area can serve as role model to other farmers
 - Important to try to change their beliefs
 - Some really want to stop the chemicals but do not know how (issue of money or resources)
 - Need to show it is possible without chemicals
- Convince them - need to have information to promote them to use biopesticide and have the good quality brands - offer alternatives; show them results
- If one farmer is successful others will follow

- What are some of the most common pests in Thailand?
 - Tomato - yellow leaf can occur due to pests, which infects plant at an early stage
 - Farmers need to understand the period when the insect comes and to know when to apply pesticides/insecticides
- Can you tell us more about vegetable grafting - how it works, its importance, and how it supports organic farming principles?
 - Example:
 - Grafted eggplant used by one farmer - grew it with a raised bed with water around it
 - Small eggplant (seen in green curry) - root system very strong, grafted with long eggplant
- Is it possible for farmers to produce vegetables year round? (because the farmers that the team are trying to help need to be growing the fruit during inspection, but they do not have an exact date for inspection)
 - Help farmer have their own brand; start to grow vegetables and try to reduce chemicals
 - PGS system is a very good system for the farmers and have to have the product in their farm first, and after that, if they change to GAP and use less chemicals, they can have other farmers join
 - They have money left if they do not need to buy chemicals, so try to emphasize this point to reduce chemical use
 - Central area is more concerned about health; changed practices after severe blood tests and even deaths from chemicals, proving that farmers can change and improve their practices and it has been done

- Have a successful group near their headquarter which serves as an example
 - Got the GAP certification first, and then went completely organic
 - They focus on short crop, which means do not need to spray chemicals
 - They have a packing house in the farm, which allows them to have better traceability and keep a better eye on facilities
 - When products come, they pack and immediately send it
 - System took many years to work out and it was a long process
 - After they join the group and do the work, the farmers had a better life
- Do you have any GAP resources that could help us/ the Kham Koon farmers?
 - GAP is easier to suggest rather than organic
 - Gather information and select the certification that is suitable for the group
 - Group farmers that want to grow the same produce or resources together - break up the group by crop
 - If they have the knowledge, you just need to tell them how much they need to produce per week, and maybe make a schedule to help them
 - Try to use all the resources in the farm (example: use banana peels as feed for chickens)
 - Have a net to protect vegetable from chickens
 - One farmer has to show their success first
 - Help them plan how to grow the vegetables and how to send them to market - how much they need, etc.
- Do you know anything about bananas having mold and yellow leaves?
 - Possible to be from cow manure (fresh, not fermented properly)
 - Would need more information to know for sure

- Do you think it's feasible to apply techniques like IPM and vegetable grafting in a rural farm setting?
 - They can use neem oil and extract it from the seeds to reduce pesticide resistance, can be taught to produce (more economic than the chemicals) - for common pests
 - Use chemical as the last resort
 - Botanical extract - many recipes to reduce it based on insect paste
 - BT for caterpillars (free living farm used this too)
 - Need to know the specific pest and crop in order to pick right biopesticide or IPM methods
- What are some common mistakes made when farmers attempt to improve their farming methods?
 - Main problem to introduce the new techniques is that the farmers want to get immediate results by spraying chemicals, do not want to wait
 - After they spray the disease will improve immediately (misconception)
 - Need to select the right technique to use, if it fails they will be less willing to change their practices
 - Be careful with the expectations at the beginnings - meet their expectations and then they will listen and come to you
 - Missed expectations and miscommunication can make things worse
- Do you know anything about Good Agricultural Practices (GAP)? How do you handle inspections/ how do you have certain produce ready at the time of inspection?
 - Use DOA extension for GAP
 - Make a plan for the inspection about the growing period

- Ex: tomato -> best season for tomato is around November and October -
January
 - Plan ahead to have inspection at this time
 - Farmer can prepare seedling for five weeks or so
- Know growing period for each crop to plan
- Farmer needs to know the techniques and have the proper training to control
pests and they do not revert back to pesticides
- Ex:
 - GAP needs to apply for specific crop
 - Lemongrass for GAP → can grow all year round
 - Water convolvulus (coconuts?) is one month - they can harvest and
plan to have it grow every month
 - Inspector will come from DOA
- Do you know anything about the Participatory Guarantee System (PGS) certification?
 - PGS system is easy for the farmers, but only DOA can certify for GAP

Appendix L - World Vegetable Center Interview Thematic Analysis Coding

Topic
Pest Management
Pesticide Use
Trainings
Certifications

Pest Management	Pesticide Use	Trainings	Certifications
Vegetable grafting is a helpful tool. One example is a grafted eggplant that is planted in a raised bed with water around it. The small eggplant is grafted with the long eggplant because the small eggplant has a strong root system.	In order to screen and select the best pesticides, start by looking at government information about pesticides and then compare the chemicals to the ones that are sold	They run the International Vegetable Training Course (IVTC), in which they invite people throughout the world who work with vegetables to participate in this training	PGS system is a very good system for the farmers and have to have the product in their farm first
Try to reduce pesticide use and use biopesticides if they are safe	Suggest to farmers that they should stop spraying their crops with any pesticides 1-2 weeks before they are harvested	Sopana helped a team in Taiwan to organize training and give lectures on IPM for IVTC	GAP is easier to suggest rather than organic.
Can use trap crops and then try to spray insecticides on the trap crop rather than the main crop	Farmers should read all instructions, including efficiency intervals, on pesticides packages	It will help if the team try to teach them about the insects/pests first and then they can choose the right practice to control them	Would help to make them a schedule of how much to produce each week and when to produce it to keep up or gain the certification

Another method is trap crops, in which additional crops that are not intended for consumption are planted with main crops, so that pests target these additional crops rather than the ones that will be sold. Trap crops should not be more than 10-20% more than the main crops and should not cost too much	The main problem is introducing new techniques which do not get the farmers as immediate results as they would by spraying chemicals	Changing the behavior of farmers is very hard to do because they often believe they cannot farm as efficiently without spraying chemicals	Make a plan for inspection about the growing period. For example, the best season for tomatoes is November and October through January, so plan to have the inspection at the end of this growing time and make sure the farmer is prepared.
A lot of farmers can use neem oil and extract it from the seeds to reduce pesticide resistance, which is more economically friendly than chemicals and can reduce common pests	If the technique selected fails, the farmers will be less willing to change their practices and more likely to go back to old chemical use	Most farmers need to learn about the major best for their typical crop and understand good versus bad insects	Water convolvulus takes one month to grow, so they can grow it every month and have it certified for GAP anytime
Nematodes are often used to control pests on bok choy or leafy brassica		Farmers will respond better if they understand what they are trying to kill in their fields	Know the growing period for each crop to plan when the farmers must be ready
Some farmers also use water nickel extract to reduce pests		It is helpful to show and convince the farmers that they can farm without chemicals and	Use the Department of Agriculture extension for GAP
Botanical extract is a recipe based on insect based used to reduce pests		Helpful to promote biopesticides and good quality brands. It is better to offer alternatives and show them results	

Bt is often used for caterpillars		If one farmer is successful in reducing chemical use, others will follow by example	
It is important to know the specific pest and crop to pick the right biopesticide of IPM method to use		It is important to group farmers that want to grow the same produce and resources together and break up groups by crop to teach them better	
		Important to teach farmers to use chemicals as a last resort	
		Be careful with expectations and miscommunications	

Appendix M - Traceability Record Sheet

บันทึกการปฏิบัติทางเกษตรที่ดี (GAP)										
เดือน				พ.ศ.						
แปลงที่				ชื่อพืช/พันธุ์พืช						
วันที่	กิจกรรมในแปลง	การใส่ปุ๋ย	การให้น้ำ	การกำจัดวัชพืช	ตัดแต่งกิ่ง	การสำรวจโรค/แมลง/ศัตรูพืช	การกำจัดโรคและแมลงศัตรูพืช	ทำความสะอาดภาชนะก่อน/หลังการเก็บเกี่ยวและล้างผักให้สะอาดก่อนนำส่ง	จำนวนผลผลิตที่เก็บได้ (กก.)	ราคาผลผลิต (บาท)/(กก.)
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หมายเหตุ : 1. ใส่เครื่องหมาย ✓ ในช่องตามกิจกรรมที่ปฏิบัติ
 2. ระบุจำนวนและน้ำหนักผลผลิตโดยประมาณที่เก็บเกี่ยวได้ (กก.)

บันทึกเพิ่มเติม : (เช่น ชื่อผู้ปลูก ผสมขึ้นเองหรือซื้อสูตรไหนมาจากไหนใด)

Appendix N - Infographic Poster 1

“GAP Farming Practices” Draft 1 (English):



“GAP Farming Practices” Draft 1 (Thai):



“GAP Farming Practices” Final Draft (English):

Let's grow **Better Food** Together!

- Incorrect:** Use **too much** fertilizer. Fertilizer is stored in a **humid** area.
- Correct:** Use **organic** fertilizers or manure when needed in the **right** amounts. Fertilizer is stored in a **dry** area.
- Incorrect:** Use insecticides during **strong winds** and **heavy rains**.
- Correct:** Use **natural** insecticides. Strictly **follow** the label.
- Incorrect:** Harvest **ahead of** time.
- Correct:** Harvest at the **right stage of maturity**.

Don't forget to always record the production data!

Kham Koon x BSAC CU x WPI

Let's grow **Better Food** Together!

- Incorrect:** Use **chemical** fertilizer.
- Correct:** Apply **compost/organic**. Plant **cover crops**.
- Incorrect:** Use **chemical** seed. Store the seeds in a **hot, humid** place.
- Correct:** Use **chemical-free** seed. Store the seeds in a **cool, dry** place.
- Incorrect:** Store produce and equipment in **dirty** and **untidy** areas.
- Correct:** **Wash** the produce after harvest. Keep **clean** and **tidy**.

Kham Koon x BSAC CU x WPI

“GAP Farming Practices” Final Draft (Thai):

มาร่วมปลูกผัก **ปลอดภัย** กันเถอะ!

- Incorrect:** ใช้ปุ๋ยมากเกินไป. เก็บปุ๋ยในพื้นที่ที่มีความชื้น.
- Correct:** ใช้ปุ๋ยอินทรีย์หรือมูลสัตว์เมื่อจำเป็นในปริมาณที่เหมาะสม. เก็บปุ๋ยไว้ในที่แห้ง.
- Incorrect:** ใช้สารเคมีฆ่าแมลงในช่วงลมแรงและฝนตกหนัก.
- Correct:** ใช้ยาฆ่าแมลงที่กำจัดธรรมชาติ. ปฏิบัติตามฉลากอย่างเคร่งครัด.
- Incorrect:** เก็บเกี่ยวก่อนเวลา.
- Correct:** เก็บเกี่ยวในช่วงเวลาที่เหมาะสม.

อย่าลืมบันทึกข้อมูลผลผลิตตลอดนะจ๊ะ!

Kham Koon x BSAC CU x WPI

มาร่วมปลูกผัก **ปลอดภัย** กันเถอะ!

- Incorrect:** ใช้สารเคมีฆ่าหญ้าฆ่าแมลง.
- Correct:** ใช้ปุ๋ยหมัก / อินทรีย์. ปลูกพืชคลุมดิน.
- Incorrect:** ไม่ทำความสะอาดเมล็ดก่อนนำไปปลูก. เก็บเมล็ดในที่ชื้นและร้อน.
- Correct:** เก็บเมล็ดพันธุ์มาใช้อ้างอิง. ทำความสะอาดเมล็ดก่อนนำไปปลูก. เก็บเมล็ดในที่แห้งและเย็น.
- Incorrect:** เก็บผลผลิตและอุปกรณ์ไว้ในพื้นที่สกปรกและไม่เป็นระเบียบ.
- Correct:** ล้างผลผลิตหลังจากเก็บเกี่ยว. รักษาความสะอาด.

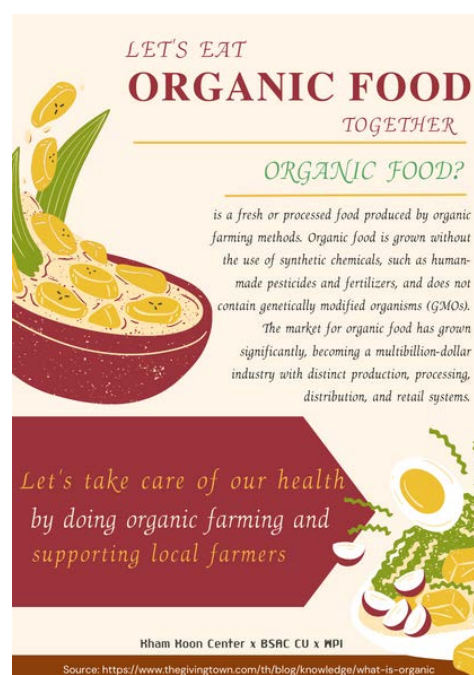
Kham Koon x BSAC CU x WPI

Appendix O - Infographic Poster 2

“What is Organic?” Draft 1 (Thai):

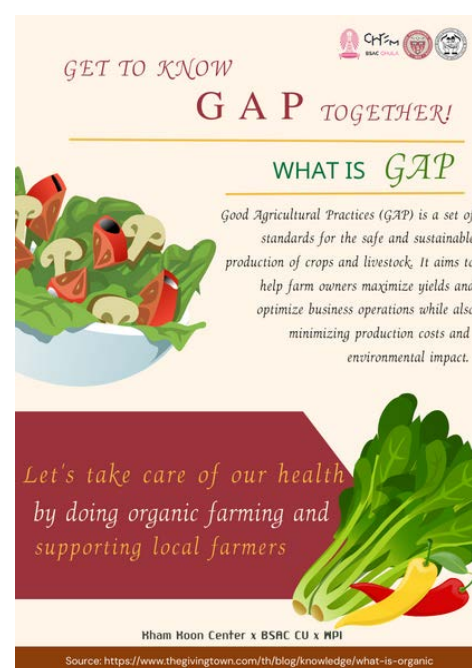


“What is Organic?” Draft 1 (English):



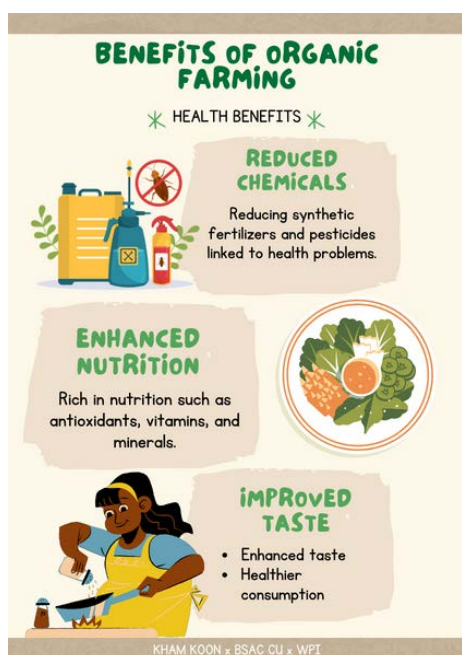
“What is GAP?” Final Draft (Thai):

(English):



Appendix P - Infographic Poster 3

“Benefits of Organic Farming” Draft 1 (English):



“Benefits of Organic Farming” Draft 1 (Thai):



“Benefits of GAP” Final Draft (English):



“Benefits of GAP” Final Draft (Thai):



Appendix Q - Handbook Final Draft (Thai)



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การรับรองมาตรฐานการ ปฏิบัติทางเกษตรที่ดี จี เอ พี (GAP)

ข้อกำหนด จี เอ พี (GAP) 8 ประการ

01 น้ำ

แหล่งน้ำที่ใช้ต้องมาจากสภาพแวดล้อมที่ไม่ก่อให้เกิดการปนเปื้อนต่อผลผลิต



02 พื้นที่ปลูก

ไม่อยู่ในสภาพแวดล้อมที่ปนเปื้อนวัตถุหรือสิ่งที่เป็นอันตรายต่อผลผลิต



03 วัตถุอันตรายทางการเกษตร

จัดเก็บเป็นหมวดหมู่ในสถานที่เก็บที่มีมิดชิด และใช้ตามคำแนะนำของกรมวิชาการเกษตร



04 การจัดการคุณภาพในกระบวนการผลิตก่อนการเก็บเกี่ยว

มีแผนควบคุมการผลิต เพื่อให้ได้ผลผลิตคุณภาพ โดยใช้หลักการปฏิบัติทางการเกษตรที่ดี



ข้อกำหนด จี เอ พี (GAP) 8 ประการ

05 การเก็บเกี่ยวและการปฏิบัติ หลังการเก็บเกี่ยว

เก็บเกี่ยวผลผลิตที่มีอายุเหมาะสม มีคุณภาพ
ตามความต้องการของตลาด



06 การผลิตผล

การขนย้ายในแปลงปลูกและการเก็บรักษา
ผลผลิตมีการจัดการด้านสุขลักษณะ เพื่อ
ป้องกันการปนเปื้อนที่มีผลต่อความปลอดภัย
ของผู้บริโภค



07 สุขลักษณะส่วนบุคคล

ผู้ปฏิบัติงานต้องมีความรู้ ความเข้าใจใน
สุขลักษณะส่วนบุคคล เพื่อสามารถปฏิบัติงาน
ได้อย่างถูกสุขลักษณะ



08 การบันทึกข้อมูลและการตาม สอบ

มีบันทึกข้อมูลการปฏิบัติงาน การใช้สารเคมี
ข้อมูลผู้รับซื้อและปริมาณผลผลิตเพื่อประโยชน์
ต่อการตามสอบ



ประโยชน์ของใบรับรองมาตรฐาน การปฏิบัติทางเกษตรที่ดี (จี เอ พี GAP)

1. มีความรู้และผลิตพืชอย่างเป็นระบบ สามารถลดต้นทุน มีรายได้จากการขายผลผลิต ผลผลิตคุ้มค่ากับการลงทุน
2. ได้ผลผลิตที่มีคุณภาพได้มาตรฐานปลอดภัยจากการปนเปื้อนผลผลิต เป็นที่ต้องการของตลาดทั้งในและต่างประเทศ
3. ลดการใช้สารเคมี ไม่ก่อให้เกิดมลพิษต่อสภาพแวดล้อม และไม่เป็นอันตรายต่อผู้ผลิต
4. ได้รับการรับรองการผลิต และผลผลิตเป็นที่ยอมรับ สร้างความเชื่อมั่นของผู้ผลิตและผู้บริโภค และเพิ่มอำนาจในการต่อรองราคาสินค้า
5. ผู้ผลิตและผู้บริโภคมีสุขภาพแข็งแรง เพราะได้บริโภคสินค้าที่มีความปลอดภัย



ขั้นตอนการขอใบรับรองมาตรฐาน จี เอ พี (GAP)

1. เตรียมเอกสารและหลักฐานขอรับการตรวจประเมินเพื่อรับรอง
มาตรฐาน (ดูหน้า 05)



2. ยื่นใบสมัครเพื่อขอการรับรองมาตรฐานแปลงเกษตร
ณ หน่วยงานของกรมวิชาการเกษตร และกรมส่งเสริมการเกษตร ทุก
แห่งทั่วประเทศโดยไม่มีค่าใช้จ่าย



3. นัดวันที่คาดว่าจะมีผลผลิตโตเต็มที่และพร้อมเก็บเกี่ยว โดย
การประสานงานกับผู้ตรวจ ไม่ใช่การรอนัดหมาย



4. เจ้าหน้าที่ตรวจแปลงพร้อมเกษตรกร ณ สถานที่ตั้งแปลง



5. เจ้าหน้าที่แจ้งผลการตรวจประเมินเบื้องต้นแก่เกษตรกร และนำผล
ตรวจยื่นคณะกรรมการตัดสินเพื่อออกใบรับรอง

ผ่าน

ไม่ผ่าน

แจ้งผลการรับรองให้เกษตรกรที่ผ่าน

แก้ไขปรับปรุงการปฏิบัติในแปลง

ส่งใบรับรองให้กับเกษตรกร

ส่งใบสมัครเพื่อการรับรอง
มาตรฐานอีกครั้ง

ใบรับรอง GAP มีอายุ 3 ปี ถ้าหากหมดอายุสามารถ
ขอใบต่ออายุใบรับรองได้

หลักฐานและเอกสารประกอบการยื่นขอใบรับรอง มาตรฐาน จี เอ พี (GAP)

1. เอกสารประกอบการยื่นขอใบรับรอง ได้แก่
 - สำเนาบัตรประจำตัวประชาชนของผู้ที่ต้องการขอการรับรอง
 - ใบสมัครขอการรับรอง (ดูหน้า 06-09)
 - หนังสือแสดงเอกสารสิทธิการใช้ประโยชน์ที่ดิน
2. ยื่นเอกสารได้ที่หน่วยงานของกรมวิชาการเกษตร และกรมส่งเสริมการเกษตร ทุกแห่งทั่วประเทศ โดยไม่มีค่าใช้จ่าย
3. ทำการปลูกพืชตามการปฏิบัติทางเกษตรที่ดี มาตรฐานจีเอพี (GAP) ทั้ง 8 ประการ
4. ให้ความร่วมมือกับเจ้าหน้าที่ในการตรวจประเมิน

หมายเหตุ: กรณีการขอรับรองแบบกลุ่มหรือนิติบุคคล ต้องแสดง
สำเนาหนังสือการจดทะเบียนเป็นนิติบุคคลหรือองค์กร

ตัวอย่างใบสมัครขอการรับรอง หน้า 1



แบบคำขอใบรับรองแหล่งผลิต GAP พืช (สำหรับรายเดียว)

- ☐ มาตรฐานการปฏิบัติทางการเกษตรที่ดีสำหรับพืชอาหาร (มกษ. 9001-2556)
☐ มาตรฐานการปฏิบัติทางการเกษตรที่ดีสำหรับพืชสมุนไพร (มกษ. 3502-2561)
☐ มาตรฐานอื่นๆ (ระบุ).....

1. เกษตรกรเจ้าของฟาร์ม (นาย/นาง/นางสาว).....นามสกุล.....
เลขที่บัตรประจำตัวประชาชน □-□□□□-□□□□-□□□□
รหัสทะเบียนบ้าน □□□□-□□□□□□-□□
ที่อยู่ บ้านเลขที่.....ชื่อหมู่บ้าน.....หมู่ที่.....
ถนน.....ตรอก/ซอย.....แขวง/ตำบล.....
เขต/อำเภอ.....จังหวัด.....รหัสไปรษณีย์ □□□□□□
โทรศัพท์.....โทรศัพท์มือถือ.....
E-mail.....

2. นิติบุคคลเจ้าของฟาร์ม/ ชื่อนิติบุคคล.....
ชื่อผู้มีอำนาจลงนามของนิติบุคคล (นาย/นาง/นางสาว).....
เลขที่ทะเบียนนิติบุคคล □-□□□□-□□□□□□-□□□□
หรือ เลขจดทะเบียนนิติบุคคล/เลขทะเบียนผู้เสียภาษี □-□□□□-□□□□□□-□□□□
ที่อยู่ของนิติบุคคล บ้านเลขที่.....ชื่อหมู่บ้าน.....หมู่ที่.....
ถนน.....ตรอก/ซอย.....
แขวง/ตำบล.....เขต/อำเภอ.....
จังหวัด.....รหัสไปรษณีย์ □□□□□□
โทรศัพท์.....โทรศัพท์มือถือ.....
E-mail.....

กรณีที่นิติบุคคลไม่ได้ดำเนินการผลิตพืชให้ระบุชื่อ-นามสกุลผู้ผลิต.....
เลขที่บัตรประจำตัวประชาชนผู้ผลิต □-□□□□-□□□□□□-□□□□
3. ที่ตั้งฟาร์ม ชื่อหมู่บ้าน.....หมู่ที่.....ถนน.....ตรอก/ซอย.....
แขวง/ตำบล.....เขต/อำเภอ.....
จังหวัด.....

หมายเหตุ : กรณีเปลี่ยนแปลงที่อยู่ หรือหมายเลขโทรศัพท์โปรดแจ้งกลับกรมวิชาการเกษตรเพื่อประโยชน์ของท่าน

F-1 (3-18/08/64) หน้า ที่ 1/4

ตัวอย่างใบสมัครขอการรับรอง หน้า 2

4. ชนิดและพันธุ์พืชที่ขอรับการรับรอง

ชนิดพืช/ พันธุ์พืช	พื้นที่ (ไร่)	อายุพืช (วัน)	กรณีไม่ผล	ระยะเวลา การผลิต (ระบุเดือน)	คาดว่าจะเก็บ เกี่ยวผลผลิต (ระบุเดือน)	ผลผลิตรวมที่ คาดว่าจะได้รับ ต่อปี	เลขประจำแปลง (กรอกโดยเจ้าหน้าที่ นายทะเบียนเท่านั้น)
			จำนวน (ตัน)				

หมายเหตุ : กรณีมีชนิดพืชมากกว่าตารางที่กำหนดไว้โปรดแนบข้อมูลเพิ่มเติม

5. แผนผังที่ตั้งแปลง แสดงเส้นทางคมนาคม และสถานที่สำคัญในบริเวณใกล้เคียง เพื่ออำนวยความสะดวกในการเดินทาง ไปยังแปลง


ทิศเหนือ

ทั้งนี้ข้าพเจ้าได้แนบ/แสดงเอกสารประกอบคำขอประกอบด้วย

- ☐ แสดงบัตรประชาชน และทะเบียนบ้านของเกษตรกร
- ☐ แบบหลักฐานการจดทะเบียนนิติบุคคล (กรณีนิติบุคคล)
- ☐ กรณีมอบอำนาจ แบบหนังสือมอบอำนาจ พร้อมสำเนาบัตรประชาชนของผู้มอบอำนาจ
- ☐ แบบสำเนาเอกสารสิทธิการใช้ประโยชน์ที่ดิน
- ☐ โฉนดที่ดิน ☐ น.ส.2 ☐ น.ส.3 ☐ น.ส.3.ก. ☐ ปส.23 ☐ ส.ป.ก.
☐ ก.ส.น.5 ☐ น.ค.3 ☐ ส.ค.1 ☐ เอกสารรับรองจากหน่วยงานที่เกี่ยวข้อง
- เลขที่เอกสารสิทธิการใช้ประโยชน์ที่ดิน.....
- เจ้าของกรรมสิทธิ์ที่ดิน ☐ เจ้าของ ☐ เช่า ☐ ได้รับอนุญาต ☐ อื่นๆ.....
- ☐ ใบอนุญาต/หนังสือสำคัญ กรณีการผลิตพืชสมุนไพรต้องได้รับอนุญาตผลิต (ปลูก) ตามกฎหมายที่เกี่ยวข้อง เช่น กัญชา กัญชง และอื่นๆ
- ☐ บันทึกเอกสารเพิ่มเติม.....

F-1 (3-18/08/64) หน้า 2/4

ตัวอย่างใบสมัครขอการรับรอง หน้า 3

6. ข้าพเจ้าขอให้คำรับรอง/ สัญญาว่า

- 1) แหล่งผลิตอยู่ในพื้นที่ที่ได้รับสิทธิครอบครองตามกฎหมาย หรือได้รับสิทธิใช้ประโยชน์จากเจ้าของที่ดิน
- 2) จะปฏิบัติตามหลักเกณฑ์และเงื่อนไขต่าง ๆ ที่หน่วยรับรองกรมวิชาการเกษตรกำหนด และจะมีการกำหนด และ/หรือแก้ไขเพิ่มเติมในภายหลัง
- 3) ยินยอมให้ข้อมูลเกี่ยวกับระบบการผลิต ตามที่ได้รับการร้องขอจากหน่วยรับรอง
- 4) ยินยอมให้หน่วยรับรองระบบงานหรือหน่วยรับรองระบบงานระดับสากลที่เกี่ยวข้องกับการรับรอง ดำเนินการสังเกตการณ์ การตรวจประเมินของกลุ่มผู้ตรวจประเมินของกรมวิชาการเกษตร ณ แหล่งผลิตของข้าพเจ้าตามที่ได้รับการร้องขอ
- 5) ยินยอมให้หน่วยรับรองเปิดเผย ชื่อ ที่อยู่ ที่ตั้งแหล่งผลิต และหมายเลขโทรศัพท์ที่สามารถติดต่อได้

ข้าพเจ้าขอรับรองว่าข้อมูลต่างๆ ที่ให้ไว้เป็นความจริงทุกประการ และได้รับเอกสารหลักเกณฑ์และเงื่อนไขที่เกี่ยวข้องกับการรับรองไว้เรียบร้อยแล้ว

ลงชื่อ.....เกษตรกร/นิติบุคคล
(.....)
วันที่.....

หมายเหตุ : กรณีมอบอำนาจ ต้องแนบหนังสือมอบอำนาจพร้อมติดอากรแสตมป์ (10 บาทถ้วน)

1. สำหรับเจ้าหน้าที่กรมส่งเสริมการเกษตร

ประเภทแปลง ☐ แปลงใหญ่ ☐ แปลงทั่วไป

ชื่อแปลงใหญ่.....วันที่ผ่านการประเมินเบื้องต้น.....

ลงชื่อ.....เจ้าหน้าที่กรมส่งเสริมการเกษตร
(.....)
วันที่.....

2. สำหรับเจ้าหน้าที่กรมวิชาการเกษตร

2.1 เอกสารประกอบคำขอ

- ☐ แสดงหลักฐานบัตรประชาชน และหลักฐานทะเบียนบ้านของเกษตรกร
- ☐ หลักฐานการจดทะเบียนนิติบุคคล (กรณีนิติบุคคล)
- ☐ หนังสือมอบอำนาจ พร้อมสำเนาบัตรประชาชนของผู้มอบอำนาจ
- ☐ สำเนาเอกสารสิทธิการใช้ประโยชน์ที่ดิน
- ☐ ใบอนุญาต/หนังสือสำคัญ กรณีการผลิตพืชสมุนไพรที่ต้องได้รับอนุญาตผลิต (ปลูก) ตามกฎหมายที่เกี่ยวข้อง เช่น กัญชา กัญชง และอื่นๆ

F-1 (3-18/08/64) หน้า 3/4

ตัวอย่างใบสมัครขอการรับรอง หน้า 3

2.2 ขอบข่ายการรับรอง

- ☐ อยู่ในขอบข่ายที่กรมวิชาการเกษตรให้บริการ และสามารถรับคำขอได้
☐ ไม่อยู่ในขอบข่ายที่กรมวิชาการเกษตรให้บริการ และไม่สามารถรับคำขอได้

2.3 คุณสมบัติของผู้ยื่นคำขอ

- ☐ มีคุณสมบัติครบถ้วนตามที่กำหนด และสามารถรับคำขอได้
☐ ไม่มีคุณสมบัติครบถ้วนตามที่กำหนด และไม่สามารถรับคำขอได้

2.4 ผลการตรวจเอกสารประกอบคำขอ

- ☐ ครบถ้วน
☐ ไม่ครบถ้วน ขอเอกสารเพิ่มเติม

☐ ไม่ถูกต้อง ระบุ.....

หมายเหตุ : ได้แจ้งให้ผู้ยื่นคำขอหรือผู้รับมอบอำนาจรับทราบแล้ว ซึ่งผู้ยื่นคำขอจะจัดส่งเอกสารดังกล่าวให้หน่วยรับรอง
กรมวิชาการเกษตร ภายในวันที่.....

ลงชื่อ.....ผู้ตรวจสอบคำขอ
(.....)

วันที่.....

ศูนย์ค้ำคูณ
Kham Koon Center



การรับรองแบบมีส่วนร่วม
พี จี เอส (PGS)

พี จี เอส (PGS) คืออะไร

พี จี เอส (PGS) คือ

เป็นระบบการรับรองเกษตรอินทรีย์โดยชุมชน เป็นการพัฒนาจากการมีส่วนร่วมของชุมชน ท้องถิ่น เครือข่ายสังคม และการแลกเปลี่ยนการเรียนรู้ เป็นทางเลือกในการรับรองเกษตรอินทรีย์ เพื่อให้เกษตรกรรายย่อยสามารถเข้าถึงตลาดได้ และเป็นการส่งเสริมตลาดภายในประเทศ ซึ่งเหมาะกับเกษตรกรรายย่อยที่กำลังเริ่มต้นพัฒนาเป็นเกษตรอินทรีย์ มีกระบวนการที่เหมาะสมกับท้องถิ่น และเปิดโอกาสให้ทุกคนในท้องถิ่นได้มีส่วนร่วมในการกำหนดกฎเกณฑ์ต่างๆร่วมกัน

O1 ความสำคัญของการรับรอง พี จี เอส (PGS)

- ช่วยเพิ่มความเป็นระเบียบให้แก่การทำงาน
- ช่วยพัฒนาชุมชนอย่างยั่งยืนและแก้ไขปัญหาต่างๆได้
- สร้างความมั่นคงทางอาหารและการเกษตร
- เพิ่มความมั่นคงทางรายได้ให้แก่ชุมชน
- สร้างภูมิคุ้มกันให้แก่ชุมชนต่อการเปลี่ยนแปลงของสภาพภูมิอากาศ
- ผลิตอาหารที่ดีต่อสุขภาพต่อผู้ผลิตและผู้บริโภค
- ส่งเสริมเศรษฐกิจในชุมชนให้มีผลผลิตเพียงพอต่อการจำหน่าย

02 ความแตกต่างระหว่าง PGS และ GAP

PGS

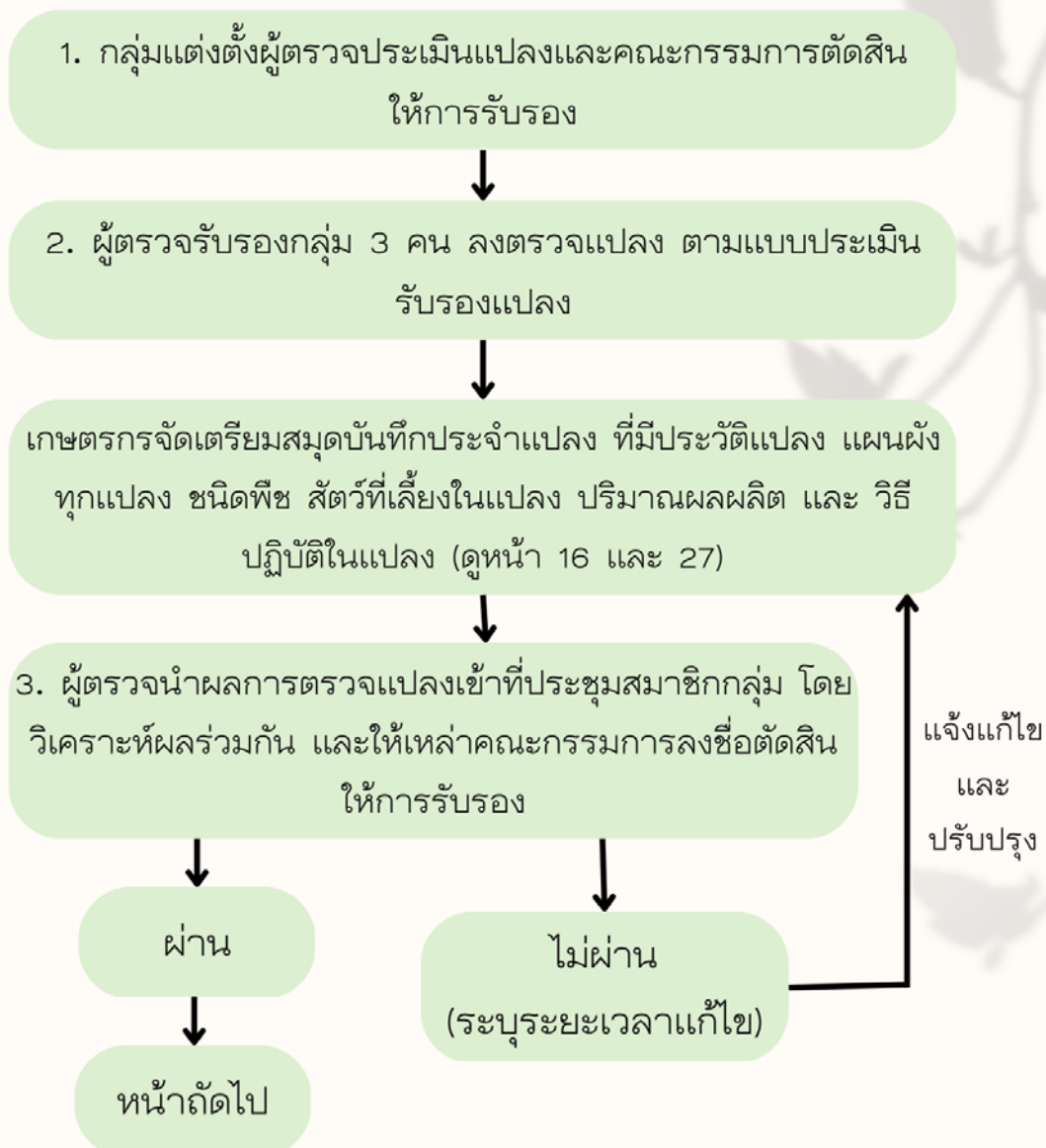
- การผลิตในทุกขั้นตอนจะต้องไม่มีการใช้สารเคมีสังเคราะห์ทุกชนิด
- คำนึงถึงสิ่งแวดล้อมอยู่เสมอ
- รักษาความสมดุลของระบบนิเวศ

GAP

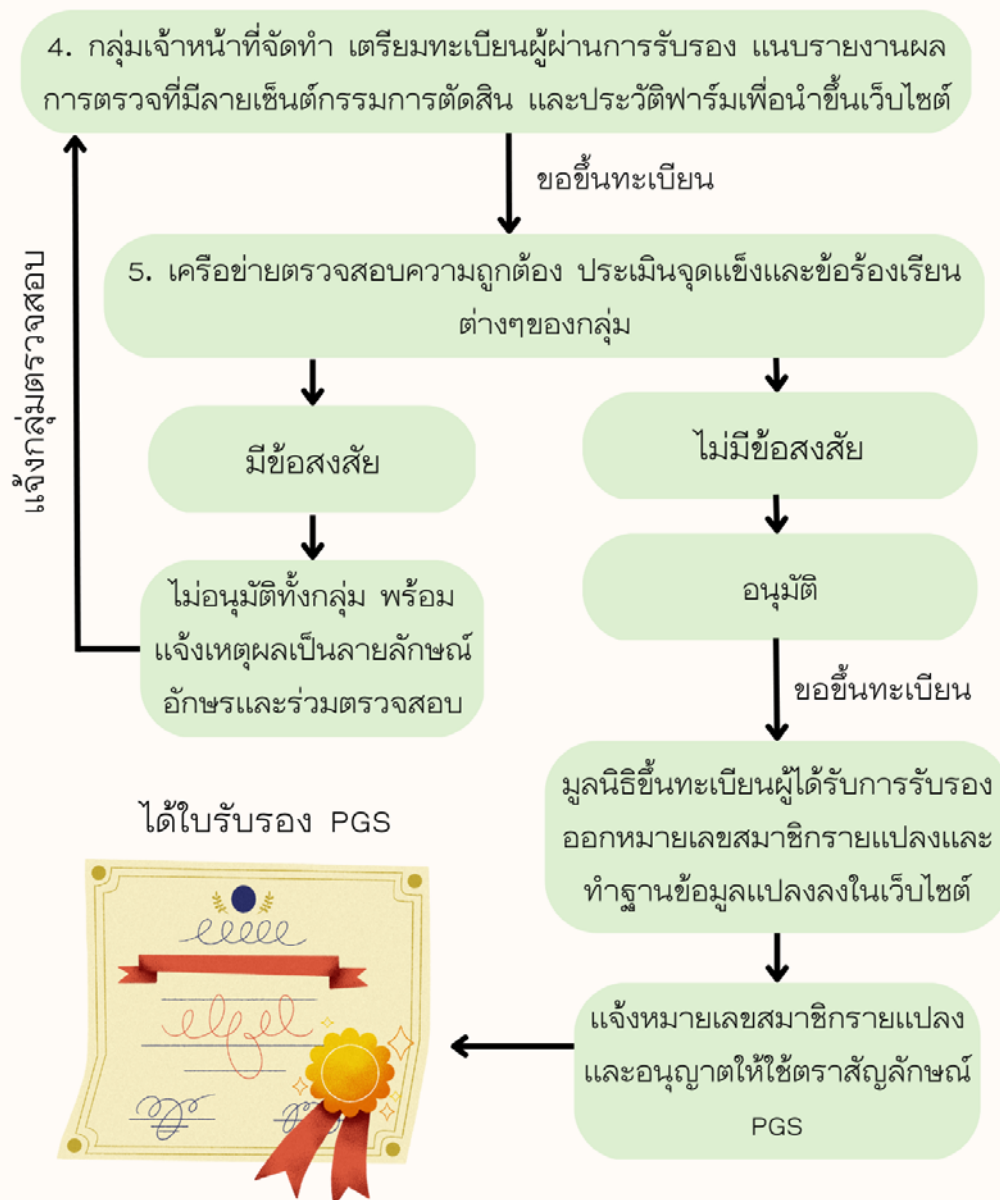
- สามารถใช้สารเคมี เพื่อกำจัดศัตรูพืช/สัตว์และรักษาโรค โดยจะต้องคำนึงถึงความปลอดภัยและความเหมาะสม
- สามารถใช้ปุ๋ยเคมีในการผลิตได้ แต่ต้องใช้ในปริมาณที่ถูกต้องและทำตามคำแนะนำบนฉลาก
- ผลผลิตต้องไม่มีสารเคมีตกค้าง หรือ อยู่ในระดับที่ไม่เป็นอันตรายต่อผู้บริโภค

หากเกษตรกรต้องการยื่นขอใบรับรอง PGS ง่ายๆ เพียงแค่ปฏิบัติตามข้อกำหนดของ GAP และงดการใช้สารเคมีในแปลงเพื่อคำนึงถึงสภาพแวดล้อมใกล้เคียง!!!

ขั้นตอนการขอใบรับรอง PGS



ขั้นตอนการขอใบรับรอง PGS



เอกสารการขอใบรับรอง PGS

กลุ่มเกษตรกรอินทรีย์ พี จี เอส

1. มาตรฐานเกษตรกรอินทรีย์ และข้อกำหนดการได้รับรองของกลุ่ม
เช่น ข้อกำหนดของการผลิต ข้อปฏิบัติ กฎระเบียบ หลักปรัชญา
ของกลุ่มและคุณค่าในการทำ
2. คู่มือการผลิตเกษตรกรอินทรีย์ของกลุ่ม
 - ความเป็นมาของกลุ่ม
 - ฐานข้อมูลของสมาชิก
 - โครงสร้างบทบาทหน้าที่ของกรรมการ
 - วิธีการตรวจประเมินและกระบวนการรับรองฟาร์ม
 - ขั้นตอนการได้รับการรับรอง
 - การใช้ตราสัญลักษณ์
 - บทลงโทษการไม่ปฏิบัติตามกฎเกณฑ์
3. เอกสารสัญญาให้สมาชิกรับทราบและลงชื่อว่าจะปฏิบัติตามข้อกำหนดในมาตรฐานและกฎกติกาของกลุ่ม
4. บันทึกการตรวจประเมินแปลง และการตรวจติดตาม
5. บันทึกการประชุม และรายชื่อผู้ร่วมประชุมทั้งหมด
6. ข้อมูลผู้ที่ได้รับการรับรอง
7. บันทึกข้อเสนอแนะและข้อปรับปรุงจากที่ปรึกษา

เอกสารการขอใบรับรอง PGS

เกษตรกรผู้ผลิต

- 1.แผนผังฟาร์ม พร้อมหมายเลขกำกับ
- 2.ชนิดของพืช สัตว์ที่เลี้ยง และปริมาณผลผลิตต่อปี
- 3.การจัดการดิน น้ำ พันธุ์พืช พันธุ์สัตว์ การควบคุมศัตรูพืช
สัตว์ ปุ๋ยอินทรีย์
- 4.หลักฐานการนำเข้าที่แสดงแหล่งที่มา เช่น ปุ๋ย เมล็ดพันธุ์
อาหารสัตว์



คำแนะนำและ
แนวทางที่ควรปฏิบัติ



คำแนะนำและแนวทางที่ควรปฏิบัติ

- ควรมีสุมดบันทึกประจำแปลง เพื่อจดกิจกรรมที่เกิดขึ้นภายในแปลงพร้อมทั้งถ่ายรูปกิจกรรมนั้นๆ
- ต้องมีผักที่โตเต็มที่ในแปลง ณ วันที่เจ้าหน้าที่มาตรวจ โดยต้องคาดการณ์เวลาเติบโตของพืชชนิดนั้นๆ
- หากเจ้าหน้าที่นัดวันตรวจแปลงแล้ว เกษตรกรต้องประจำอยู่ที่แปลงในวันนั้นๆ
- ก่อนที่จะนัดหมายเจ้าหน้าที่ เกษตรกรต้องตรวจสอบให้แน่ใจว่าได้ทำการยื่นใบสมัคร และเอกสารอื่นๆให้เรียบร้อยแล้ว และต้องคาดการณ์เวลาเติบโตของพืชชนิดนั้นๆ เจ้าหน้าที่จึงจะทำการนัดตรวจแปลง หากไม่แน่ใจว่ายื่นเอกสารเรียบร้อยแล้ว ให้สอบถามผู้ประสานงานที่เกี่ยวข้อง
- ไม่ควรให้สัตว์เลี้ยงเดินในแปลงหรือเข้าไปกลั้วผลผลิต

เคล็ดลับการทำเกษตรปลอดภัย

01 เมล็ด

1. ใช้น้ำอุ่นหรือความร้อนแห้ง(ตากแดด) ก่อนนำไปปลูกเพื่อทำความสะอาด และเพื่อฆ่าโรคและแมลงที่ติดมากับเมล็ด
2. ใช้ปุ๋ยอินทรีย์ช่วยเร่งการเจริญเติบโตในระยะกล้า
3. ใช้จุลินทรีย์ปฏิปักษ์ เช่นไตรโคเดอร์มา เพื่อควบคุมโรคในระยะต้นกล้า
4. ใช้สารสกัดธรรมชาติป้องกันกำจัดโรคและแมลงศัตรูพืชในขณะที่เก็บรักษา เมล็ดพันธุ์และระยะต้นกล้า
5. ใช้จุลินทรีย์ให้สีหรือสีย้อมธรรมชาติหากต้องการเคลือบเมล็ดพันธุ์

02 ปุ๋ยคอกหมัก

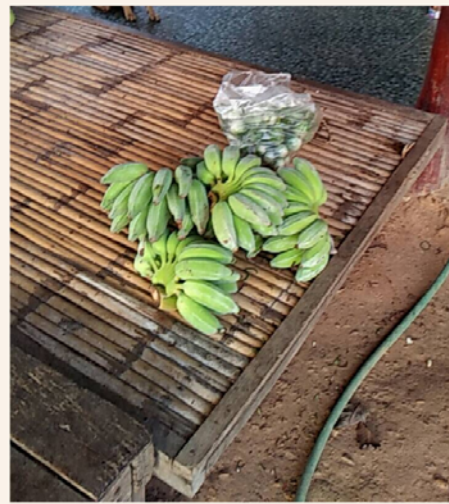
ขั้นตอนการทำปุ๋ยคอกหมัก

- นำมูลสัตว์ที่ได้ออกมาตากแดด ให้แห้งสนิททั่วกัน ประมาณ 1-2 วัน
- ผสมปุ๋ยคอก รำข้าวและแกลบแห้ง อย่างละ 1 กระสอบ ให้เข้ากัน โดยทำในพื้นที่ที่เตรียมเอาไว้สำหรับการปักปุ๋ยคอกโดยเฉพาะ
- ผสมกากน้ำตาลน้ำหมักชีวภาพและน้ำเปล่าลงในภาชนะขนาดใหญ่ ตามสัดส่วนที่ได้เตรียมเอาไว้ให้เข้ากันและใส่ไส้เดือนเพื่อทดสอบคุณภาพ
- คอยตรวจเช็คอยู่เป็นระยะ เมื่อปุ๋ยคอกที่ทำเอาไว้มีความแห้งและร่วนดีแล้ว จึงสามารถนำไปใช้งานได้
- ปริมาณการใช้ของปุ๋ยคอก ขึ้นอยู่กับสัดส่วนและความต้องการของพืชผลทางการเกษตรที่ปลูกเอาไว้

เคล็ดลับการทำเกษตรปลอดภัย

03 ทำความสะอาด ที่วางและการล้างผัก

- อุปกรณ์ภาชนะบรรจุที่ใช้รวมถึงวิธีการเก็บเกี่ยวต้องสะอาดไม่ก่อให้เกิดอันตรายต่อคุณภาพของผลิตผล และไม่ปนเปื้อนสิ่งอันตรายที่มีผลต่อการบริโภค
- ที่วางผักควรวางสูงจากพื้นอย่างน้อย 60 ซม.
- ทำความสะอาดเครื่องมือและที่วางอย่างน้อยหนึ่งครั้งต่อเดือน



04 สุขลักษณะส่วนบุคคล

- ในกรณีที่จะต้องสัมผัสกับสารเคมี เช่น เมื่อปลูกต้นกล้าหรือการล้างเมล็ด ควรสวมถุงมือและหน้ากากอนามัยทุกครั้ง
- ผู้ปฏิบัติงานต้องมีความรู้ที่เหมาะสม หรือผ่านกระบวนการอบรม การปฏิบัติที่ถูกต้อง และถูกสุขลักษณะ
- มีการดูแลสุขลักษณะส่วนบุคคล เพื่อป้องกันไม่ให้เกิดผลผลิตเกิดการปนเปื้อนจากผู้สัมผัสกับผลิตผล โดยตรง โดยเฉพาะในขั้นตอนการเก็บเกี่ยวและหลังการเก็บเกี่ยวสำหรับพืชที่ใช้บริโภคสด

เคล็ดลับการทำเกษตรปลอดภัย

05 การกำจัดศัตรูพืช

5.1 การควบคุมศัตรูพืชโดยวิธีผสมผสาน (IPM)

กระบวนการที่ใช้ในการแก้ปัญหาศัตรูพืชที่เน้นการป้องกันศัตรูพืชในระยะยาวและความเสียหายต่อระบบนิเวศ เช่น

1. การใช้พืชพันธุ์ต้านทานต่อโรคและแมลง และเลือกระยะเวลาปลูกที่เหมาะสมเพื่อหลีกเลี่ยงโรคและแมลงที่อาจระบาด
2. ควรมีการปลูกพืชหมุนเวียน เพื่อตัดวงจรชีวิตโรคและแมลงศัตรูพืช
3. การใส่ปุ๋ยในปริมาณที่เหมาะสม ที่ละน้อยแต่บ่อยครั้ง
4. ควรปลูกให้พืชมีระยะห่างที่เหมาะสม ไม่ชิดหรือห่างกันจนเกินไป
5. ให้น้ำในปริมาณที่เหมาะสม ไม่ควรให้น้ำเวลาช่วงพลบค่ำเพราะจะทำให้โรครบาดได้ง่าย
6. การใช้เหยื่อล่อควบคุมไปกับวิธีการอื่นๆ เช่น การใช้กับดัก (กับดักกาวสีเหลือง) การใช้ไฟล่อแมลง แต่ทั้งนี้ต้องดูความเป็นไปด้วย
7. การทำความสะอาดแปลงปลูก
8. การใช้พืชล่อโดยการปลูกต้นไม้ที่แมลงศัตรูชอบ เมื่อแมลงเข้าทำลายให้ใช้สารเคมีปราบ
9. การใช้สารสกัดจากพืช ได้แก่ สะเดา คุณข้า ตะไคร้หอม ขี้เหล็ก บอระเพ็ด สาบเสือ กลอย ไพลแดง หนอนตายหยาก เป็นต้น
10. การเขตกรรมอื่นๆ เช่น การตัดแต่งกิ่ง การตัดแต่งดอก - ผล การทำความสะอาดสวน
11. ควรอนุรักษ์ศัตรูธรรมชาติที่มีประโยชน์ไว้จะช่วยให้กำจัดศัตรูพืชได้เร็วและมีประสิทธิภาพมากขึ้น
12. การปลูกผักในมุ้ง จะช่วยป้องกันการทำลายของแมลงศัตรูพืชให้ผลผลิตที่คุณภาพสูงไม่มีร่องรอยการทำลายของแมลง

เคล็ดลับการทำเกษตรปลอดภัย

5.2 พืชกับดัก

เป็นพืชที่ใช้ในการดึงดูดศัตรูพืช มักใช้ในการล่อแมลงออกจากพื้นที่ใกล้เคียง หรือพื้นที่เพาะปลูกทางการเกษตร

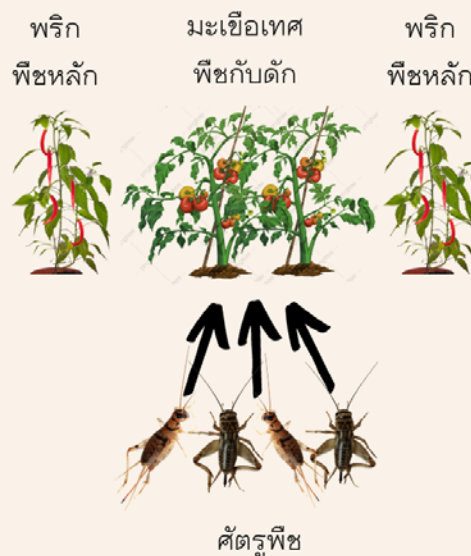
ขั้นตอนการปลูกพืชกับดัก

1. ปลูกพืชกับดักก่อนจะปลูกพืชหลักก่อน 2-3 สัปดาห์

2. ปลูกพืชที่จะเป็นผลผลิตหลัก

3. ปลูกพืชกับดักใหม่ทุกๆ 2-3 สัปดาห์ขณะที่พืชหลักเติบโต

4. หากเริ่มมีศัตรูพืช ให้ใช้สารกำจัดศัตรูพืชกับพืชกับดักเท่านั้น



เคล็ดลับการทำเกษตรปลอดภัย

5.3 ขวดกักน้ำตาล

คือ ขวดพลาสติกที่มีกากน้ำตาลอยู่ข้างในขวดและแขวนไว้รอบๆแปลง ซึ่งขวดนี้สามารถดักจับแมลงที่มากินกากน้ำตาลได้

วิธีทำ

1. เติมหากน้ำตาลประมาณ 3 เซนติเมตร ลงในขวดพลาสติก
2. เปิดทิ้งไว้และแขวนไว้บนหน่อไม้รอบๆแปลง ห่างกันประมาณ 10 เมตร



เคล็ดลับในการกำจัดศัตรูพืช

5.4 สารกำจัดศัตรูพืชชีวภาพ

สารกำจัดศัตรูพืชชีวภาพเป็นสารที่ได้มาจากวัสดุธรรมชาติซึ่งปลอดภัยกว่าสารกำจัดศัตรูพืชทั่วไปเพราะมีความเป็นพิษต่ำ เพื่อทำความเข้าใจว่าผลิตภัณฑ์สารกำจัดศัตรูพืชทางชีวภาพเหมาะสมกับสถานการณ์หรือไม่ ผู้ใช้ควรอ่านฉลากและคู่มืออื่นๆ ก่อนใช้

ความแตกต่างระหว่าง

สารกำจัดศัตรูพืชชีวภาพ

ปลอดภัยต่อแมลงสายพันธุ์อื่นๆ
ที่เป็นประโยชน์



ไม่ก่อให้เกิดสารพิษตกค้าง
และมลภาวะ



ส่วนมากจะมีราคาที่ถูกกว่า



ศัตรูพืชมีโอกาสน้อยที่จะ
ทนทานต่อสารกำจัดชีวภาพ



สารเคมีกำจัดศัตรูพืช

อันตรายต่อแมลงสายพันธุ์อื่นๆ
ไม่ใช่เป้าหมาย

ก่อให้เกิดสารพิษตกค้าง
และมลภาวะ

ส่วนมากราคาจะสูงกว่า

ศัตรูพืชจะทนทานต่อสารเคมีมาก
ขึ้นในการใช้งานระยะยาว

ตัวอย่างสารกำจัดศัตรูพืชชีวภาพ ที่ใช้โดยทั่วไป

ไตรโคเดอร์มา (Trichoderma)

การใช้เชื้อราชีวภาพไตรโคเดอร์มา:

- สามารถช่วยลดกิจกรรมของเชื้อโรคพืช
- ช่วยลดปริมาณเชื้อโรคพืช
- ช่วยเพิ่มการเจริญเติบโตและเพิ่มผลผลิตของพืช
- ช่วยเพิ่มความต้านทานโรคของพืช
- สามารถควบคุมราที่ทำให้เกิดโรคพืชได้หลายชนิด



เชื้อ บีที (BT)



เชื้อบีที (BT) เป็นเชื้อจุลินทรีย์ที่มีประโยชน์สามารถนำมาใช้กำจัดแมลงศัตรูพืช และ ศัตรูมนุษย์ เช่น ผีเสื้อ แมลงห้ำ และแมลงเบียน เป็นต้น เชื้อบีทีมีความปลอดภัยสูงไม่เป็นอันตรายต่อ มนุษย์ สัตว์ และสิ่งแวดล้อม

- ฉีดช่วงเช้า หรือตอนเย็นที่อากาศไม่ร้อน
- ฉีดพ่นก่อนปลูก 5-7 วัน เพื่อฆ่าเชื้อราและแบคทีเรียที่อยู่บนดินและใต้ดิน
- ฉีดพ่นลงดินหลังปลูก เพื่อป้องกันเชื้อรา แบคทีเรีย และไวรัส

เชื้อ เอ็น วี พี (NPV)

เชื้อไวรัสชีวภาพ NPV สามารถ ใช้ร่วมกับ BT ในการป้องกันโรคกับหนอนผีเสื้อศัตรูพืชที่มีประสิทธิภาพสูง มีคุณสมบัติพิเศษคือมีความเฉพาะเจาะจงต่อแมลงเป้าหมายเท่านั้น ไม่เป็นอันตรายต่อแมลงที่มีประโยชน์ คนหรือสัตว์



แหล่งที่มา
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<http://www1a.biotec.or.th/Shrinfo/documents/BIOTEC%20for%20Farm%20Product.pdf>
https://vric.ucdavis.edu/pdf/pests_btCaterpillarControl.pdf



สมุดบันทึกประจำแปลง

สมุดบันทึกประจำแปลง ใช้สำหรับการบันทึกรายละเอียดและการดำเนินงานในแปลง อีกทั้งยังส่งเสริมประสิทธิภาพในการผลิตสินค้าเกษตรให้มีคุณภาพ มาตรฐาน และเพียงพอต่อความต้องการของผู้บริโภค รวมทั้งพัฒนาระบบการตรวจสอบรับรองคุณภาพสินค้า และกระบวนการผลิตให้มีคุณภาพและปลอดภัยต่อผู้บริโภค

01 สมุดบันทึกประจำแปลงสำคัญอย่างไร

- ช่วยเพิ่มความเป็นระเบียบให้แก่การทำงาน
- สามารถย้อนกลับไปตรวจสอบได้ เช่น ถ้าเกิดปัญหาจะสามารถกลับไปแก้ไขได้ตรงจุดและมีประสิทธิภาพที่สุด
- ช่วยให้เราจดจำข้อมูลได้ดียิ่งขึ้นเมื่อมีการจดบันทึก
- เพื่อให้ผู้บริโภคตรวจสอบย้อนกลับได้
- เสริมสร้างความมั่นใจทางด้านความปลอดภัยของผลผลิต
- ใช้เป็นหลักฐานในการยื่นขอใบรับรองมาตรฐานต่าง

สมุดบันทึกประจำแปลง

02 วิธีการจดบันทึกแปลงและข้อมูลสำคัญที่ ควรจด

1. ต้องบันทึกข้อมูลการปฏิบัติจริง
2. จำนวนพื้นที่ปลูก วันที่ปลูก
3. การปฏิบัติในการเพาะปลูก
4. การบำรุงรักษาดิน
5. ที่มาของปัจจัยการผลิต
6. การป้องกันและกำจัดศัตรูพืช
7. วันที่เก็บเกี่ยวผลผลิต
8. ผลผลิตต่อไร่
9. รูปถ่ายทุกขั้นตอนในการปลูก
10. ข้อมูลผู้รับซื้อผลผลิตหรือแหล่งที่นำผลผลิตไปจำหน่าย
11. การเก็บรักษาสมาชิกข้อมูลการผลิตอย่างน้อย 2 ปี

หมายเหตุ :

1. สมุดบันทึกควรจะมีน้ำหนักแข็งแรงไม่ฉีกขาดง่าย/ไม่เสี่ยงต่อการหาย
2. ต้องบันทึกต่อเนื่องทุกปี

ตัวอย่างตารางบันทึกประจำวันแปลง แบบที่ 1

บันทึกการปฏิบัติงานทางเกษตรที่ดี (GAP)										
เดือน				พ.ศ.						
แปลงที่				ชื่อพืช/พันธุ์พืช						
วันที่	กิจกรรมในแปลง	การใส่ปุ๋ย	การให้น้ำ	การกำจัดวัชพืช	ตัดแต่งกิ่ง	การสำรวจโรค/แมลง/ศัตรูพืช	การกำจัดโรคและแมลงศัตรูพืช	ทำความสะอาดภาชนะก่อนนำใส่	จำนวนผลผลิตที่เก็บได้ (กก.)	ราคาผลผลิต (บาท)/(กก.)
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หมายเหตุ : 1. ใส่เครื่องหมาย ✓ ในช่องตามกิจกรรมที่ปฏิบัติ
2. ระบุจำนวนและน้ำหนักผลผลิตโดยประมาณที่เก็บเกี่ยวได้ (กก.)

บันทึกเพิ่มเติม : (เช่น ชื่อผู้บันทึก ผลผลิตเฉลี่ยหรือชื่อผู้ตรวจประเมินจากภายนอก)

แหล่งที่มา

- <https://warning.acfs.go.th/th/articles-and-research/view/?page=34>
- <https://www.opsmoac.go.th/satun-manual-files-441891791816>
- https://gap.doa.go.th/web_manual/doc/F/F-1.pdf
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- <https://extension.uga.edu/publications/detail.html?number=C1118&title=trap-cropping-for-small-market-vegetable-growers>
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- https://assets.publishing.service.gov.uk/media/57a08d4c40f0b652dd0018b8/R7299_FTR_anx2.pdf
- <http://www1a.biotec.or.th/Shrinfo/documents/BIOTEC%20for%20Farm%20Product.pdf>
- https://vric.ucdavis.edu/pdf/pests_BtCaterpillarControl.pdf
- <https://qsds.go.th/dssilk/wp-content/uploads/sites/122/2021/07/GAP.pdf>

เกี่ยวกับเรา

พญ. ทานทิพย์ อารังวรารังกูร

ผู้บริหารศูนย์คำคุณ

เมื่อพญ.ทานทิพย์ได้เริ่มทำงานที่โรงพยาบาลอุบลรัตน์จึงตระหนักได้ว่าต้นตอของปัญหาสุขภาพนั้นมาจากสิ่งที่ผู้คนรับประทานในชีวิตประจำวัน พญ.ทานทิพย์ได้ร่วมมือกับหลายองค์กรเพื่อส่งเสริมการใช้สารเคมีอย่างปลอดภัยในภาคเกษตรทั้งผู้บริโภคและผู้ผลิตและได้สนับสนุนเกษตรกรในท้องถิ่นให้ได้รับการรับรองการปฏิบัติทางการเกษตรที่ดีเพื่อยืนยันคุณภาพผลผลิต



จุดเริ่มต้นศูนย์คำคุณ

ศูนย์คำคุณก่อตั้งในปี 2537 พัฒนาขึ้นจากความคิดเรื่องประชาคมตำบลที่เสนอโดยศาสตราจารย์ นายแพทย์ประเวศ วะสี โดยท่านได้พูดและเขียนลงในหนังสือหลายเล่มว่า "ประเทศไทยจะหายจนอย่างรวดเร็ว ถ้าคนทั้ง 7,000 กว่าตำบลทั่วประเทศรวมตัวกันทั้ง ผู้นำชุมชน นักพัฒนาภาครัฐ นักพัฒนาองค์กรเอกชน นักวิชาการ นักธุรกิจและสื่อมวลชนโดยรวมตัวกันในรูปพหุภาคีมาาร่วมคิดร่วมเรียนรู้สู่การปฏิบัติอย่างต่อเนื่องและสม่ำเสมอจนสามารถพัฒนาเกษตรที่พึ่งตนเองได้ จนมีเหลือกินเหลือใช้ได้แจก ช่วยให้มีเพื่อน เมื่อมีมากพอจนเหลือกินเหลือใช้ได้แจกได้ขาย มีเงินเป็นสภาพมั่งมีศรีสุขของที่เหลือก็นำมาแปรรูปเป็นอุตสาหกรรมชุมชนจะได้กินและได้นานยิ่งขึ้น เหลือกิน เหลือใช้เหลือแจกได้ขายในราคาที่ดีขึ้น นอกจากนี้สินค้าเกษตรกรรมและสินค้าแปรรูปที่มีต้นทุนไม่มากก็สามารถนำมาบริหารจัดการเป็นธุรกิจชุมชนใน 2 รูปแบบ

รูปแบบแรกรวมกันส่งไปขายและ

รูปแบบที่สองคือ หาสิ่งดึงดูดให้คนเข้ามาท่องเที่ยวแล้วมากิน และใช้ในห้องถิ่น เช่น ทำวังปลา สร้างป่าชุมชน สร้างพิพิธภัณฑ์ของชุมชน จะทำให้เกิดการท่องเที่ยวเชิงวัฒนธรรม และอนุรักษ์ธรรมชาติ ทำให้มีรายได้ในชุมชนสามารถถอดอ้อมเป็นการเงินการคลังชุมชน ที่สามารถจัดสวัสดิการต่างๆมากมายแก่ชุมชน"

ด้วยวิธีคิดดังกล่าวศูนย์คำคุณจึงเกิดขึ้นโดยบุคคลากรสาธารณสุขกลุ่มหนึ่งได้ช่วยกันออกเงินซื้อที่แปลงไร่มันและไร่อ้อย ที่ทำมาแรมปีจนดินเสื่อมสภาพ ถ้าไม่ใช้ปุ๋ยเรียกว่าเก็บเกี่ยวได้น้อยมาก บุคคลากรสาธารณสุขกลุ่มนี้ซื้อที่แล้วตกลงกันว่า จะปลูกต้นไม้ยืนต้นและจะบริจาคที่ดินด้านหน้าส่วนหนึ่งให้มูลนิธิฯ เพื่อพัฒนาเป็นศูนย์คำคุณทำทฤษฎีของศาสตราจารย์นายแพทย์ประเวศ วะสี ให้เป็นจริง

การดำเนินการในช่วงแรกเป็นไปด้วยความยากลำบาก เพราะขาดทั้งเงินทุนและความรู้เรื่องเงินทุนมีปัญหาลดลงทันที เมื่อคิดได้ว่าจะทำจากเล็กไปหาใหญ่ ตามกำลังโดยไม่ต้องรีบร้อน ค่อยเป็นค่อยไป ส่วนความรู้กลายเป็นเรื่องใหญ่ เพราะที่ดินทั้งหมดกว่า 60 ไร่ กลายเป็นทุกซ์ทันที เมื่อคิดถึงการเกษตรแผนใหม่ที่ต้องใช้ระบบชลประทาน ปุ๋ยเคมี ยาฆ่าแมลงและยาฆ่าหญ้า มาต่อสู้กับสภาพดินแลว น้ำแล้ง ป่าหมด ในพื้นที่เช่นนี้ การทดลองรูปแบบต่างๆ จึงเกิดขึ้นนับตั้งแต่การ ปลูกมะละกอ ปรากฏว่ามะละกอตาย ทีแรกเข้าใจว่าเป็นเพราะร้อน คนงานจึงเอาใบมันสำปะหลังมา เป็นร่มให้มะละกอ จากนั้นรดน้ำพรวนดิน ใส่ปุ๋ย ปรากฏว่ามะละกอตายเหมือนเดิมเพราะดินรอบต้นมะละกอมีลักษณะแข็ง แต่กลับพบว่ามันสำปะหลังเจริญเติบโตอย่างสวยงามที่สุด ความรู้จากภูมิปัญญาท้องถิ่นช่วยแก้ไขปัญหการฟื้นฟูสภาพป่าของศูนย์คำคุณได้อย่างรวดเร็ว

เนื่องจากมีการนำหลักการต่างๆของภูมิปัญญาชาวบ้านมาใช้ เริ่มจากการใช้พืชพี่เลี้ยง เช่น กล้วย เพราะกล้วยมีใบมากมายไว้ช่วยบังแดดและลมแก่ต้นไม้อื่นๆ ลำต้นของกล้วยมีน้ำมากมายช่วยยึดอายุต้นไม้อื่นๆในหน้าแล้ง แถมยังมีปลีกล้วย ให้กินเป็นอาหารและใช้เป็นสมุนไพรได้ ทั้งยังมีใบกล้วยและหยวกกล้วยที่ยังมีประโยชน์ ไม้ที่คัดเลือกมาปลูกเป็นไม้พื้นเมืองที่โตเร็วและทนโรค ทนแล้ง เช่น สะเดา ชีเหล็ก ดินเบ็ด ต้นยาง มะม่วงป่า ประดู่ ต้นแดง ต้นกุง ต้นจิก ต้นมะเหลื่อม ฉำฉา สลับกับไม้อื่นๆที่ต้องการจะปลูก เช่น มะพร้าว มะม่วง กระท้อน ขนุน แล้วใส่ขี้ทุกอย่างลงไป ยกเว้นขี้เกียจให้ตัดออก

รวมทั้งยังหาแนวทางเพื่อส่งเสริมอาชีพให้ผู้ติดเชื้อโรคเอดส์ โดยอบรมวิธีการปลูกสมุนไพร และให้พื้นที่ข้างต้นไม้ยืนต้นสำหรับปลูก พร้อมทั้งรดน้ำพรวนดินอย่างสม่ำเสมอ เมื่อพืชสมุนไพรโตได้ระยะหนึ่ง พวกเขาจึงช่วยกันเติมน้ำหมักชีวภาพสัปดาห์ละครั้ง ปรากฏว่าปราชญ์ชาวบ้านมาเยี่ยมคำคุณที่โรคดหมอไม่ได้ คนมาดูงานที่ศูนย์คำคุณกลับไปล้วนมีกำลังใจ เพราะขนาดฝีมือผู้ติดเชื้อโรคเอดส์ยังทำให้ศูนย์สวยงามขนาดนี้ พวกเขาต้องกลับไปทำให้สุดฝีมือและผลตอบแทนจากงานคือความสุข จะต้องเพิ่มขึ้นอย่างแน่นอน แล้วเงินจะไปไหนเสีย

ศูนย์เผยแพร่ความคิดและรูปธรรม

ศูนย์คำคุณเติบโตขึ้นอย่างรวดเร็วทั้งต้นไม้อื่นในศูนย์และชื่อเสียงที่สื่อต่างๆ มีเมตตาช่วยกันเสนอออกไปทั้งนี้เพราะภารกิจของศูนย์คำคุณวางอยู่บนความสุขเป็นตัวตั้ง โดยเชื่อทฤษฎีของท่านพุทธทาสที่ว่า “งานคือความสุข ความสุขคืองาน ถ้าอยากมีความสุขก็จงทำงาน แล้วจงทำงาน แล้วเงินทองจะไปในเสีย” พร้อมด้วยการอยู่ร่วมกันอย่างสมดุลทั้งระหว่างมนุษย์ และมนุษย์กับสิ่งแวดล้อมอุดมสมบูรณ์ด้วยความรักความเอื้ออาทรต่อกัน ผู้ติดเชื่อมีอากาศบริสุทธิ์จากร่มเงาของต้นไม้ยืนต้น มีพืชผักที่ปลูกไว้กิน แพทย์พื้นบ้านมีสมุนไพรไว้อบและประคบผู้ป่วยโดยจัดแบ่งแยกส่วนจากแปลงของผู้ติดเชื่อ ได้นวดบำบัด ผู้ที่มีอาการเคล็ด ขัด ยอก ปวดเมื่อยตามตัว รวมทั้งผู้ที่เปื้อนอัมพาตจนมีอาการดีขึ้นมาหลายท่าน แม่บ้าน ผู้นำเกษตร พากันนำผลพวงของเครือข่ายพระธรรมรักษาศีลวัตรสิ่งแวดล้อม ชุมชนแพทย์พื้นบ้าน อบต.ทุ่งโป่ง เครือข่ายเกษตรกร ชุมชน อสม.เครือข่ายมิตรไหม ฝ่ายงาม ชุมชนผู้ติดเชื่อ และเรื่องราวอื่นๆ อีกมากมาย รวมทั้งการสร้างธุรกิจชุมชนที่เกื้อหนุนครอบครัวที่อบอุ่นและชุมชนที่แข็งแกร่งอย่างมีความสุข

ปัจจุบันศูนย์คำคุณได้นำความรู้ที่มีร่วมกับความรู้ของปราชญ์ชาวบ้านที่นำวิจัยและพัฒนาตลอดชีวิต พัฒนาเป็นหลักสูตรต่างๆ ตั้งแต่หลักสูตรฐานงาน 1 วัน หลักสูตรวิทยากรกระบวนการเพื่อการเปลี่ยนแปลงสู่การพึ่งตนเอง และพึ่งพากันเองภาคประชาชน หรือที่ชาวบ้านนิยมเรียกสั้นๆ วปอ.ภาคประชาชน ซึ่งเป็นหลักสูตร 5 วัน พาคณคิวิเคราะห์ถึงภาพสุดท้ายของความทุกข์ และวิธีดับทุกข์ให้หมดไป รวมทั้งวางแผนปฏิบัติระดับปัจเจกและระดับกลุ่ม ผลการดำเนินการที่ผ่านมามีผู้มาศึกษาดูงานปีละประมาณ 6,000 คน มีการฝึกอบรมหลักสูตร วปอ.ภาคประชาชนไปแล้ว 128 รุ่น จำนวน 6,250 คน ทำให้ผลผลิตของเกษตรกรอำเภออุบลรัตน์ได้จำหน่ายแก่ผู้มาดูงานและผู้มารับการฝึกอบรม ช่วยให้มีรายได้จากการทำอาหารอย่างต่อเนื่อง

อนาคตของศูนย์คำคุณ

ศูนย์คำคุณได้วางแผนบทบาทตนเองในอนาคตเป็นสถาบันฝึกอบรมและหน่วยงานจัดการความรู้และหน่วยงานเครือข่ายที่เป็นอิสระ เครือข่ายของมหาวิทยาลัยภูมิปัญญาไทอีสานคืนถิ่น โดยเป็นทั้งที่ดูงานและที่ประสานงานของเครือข่ายปราชญ์ชาวบ้านและพหุภาคีภาคอีสาน เป็นที่ให้กำลังใจคนและสร้างความสุขแก่ผู้คนโดยเฉพาะอย่างยิ่งผู้ที่สนใจกิจกรรมที่มีไปอย่างต่อเนื่องคือวารสารคำคุณ การคัดเลือกคนมารับรางวัลคนคำคุณ รวมทั้งการระดมทุนเพื่อให้คนมาร่วมคิดร่วมเรียนรู้การปฏิบัติอย่างต่อเนื่องและสม่ำเสมอ ท้ายที่สุด ศูนย์คำคุณจะเป็นศูนย์ปฏิบัติธรรมที่เน้นตัวอย่างการสร้างความสุขจากการมีหลักประกันในชีวิต ความสุขจากการมีร่างกายและจิตใจที่แข็งแรง ความสุขจากการมีครอบครัวที่อบอุ่น จากชุมชน เข้มแข็ง จากสิ่งแวดล้อมดี จากอิสรภาพ จากความภาคภูมิใจ และจากการอยู่ร่วมกันได้อย่างสมดุลทั้งระหว่างมนุษย์กับมนุษย์และมนุษย์กับสิ่งแวดล้อม

ที่ตั้ง



27 หมู่ 9 บ้านแหลมทอง ตำบลทุ่งโป่ง อำเภอบุรินทร์
ขอนแก่น 40250

ริมถนนเส้นทางเข้าเขื่อนอุบลรัตน์บริเวณหลักกิโลเมตรที่ 9
ท่านสามารถเดินทางเข้ามาได้ 2 เส้นทาง
จากทางขอนแก่น ศูนย์คำคุณจะอยู่ทางขวามือ
จากทางเขื่อนอุบลรัตน์ ศูนย์คำคุณจะอยู่ทางซ้ายมือ
เมื่อเห็นป้าย "ถึงศูนย์คำคุณแล้ว" ให้เลี้ยวเข้าตามทาง ท่านจะพบ
กับต้นไม้ยืนต้นหลากหลายนานาพันธุ์แซมด้วยสมุนไพร

กลุ่มนิสิต



นางสาวนภัสสร	ชฎานันท์ตระกูล
นางสาวกักรินทร์	ผุดผ่องแผ้ว
นางสาววิษฐา	ศิริอยู่วิทยา
นางสาวสุรางคณา	ศรีฉันทะมิตร
Joelis	Velez Diaz
Sophia	Islam
Sophia	Mularoni
Theresa	Rosato
Sophia	Islam

กลุ่มนิสิตชั้นปีที่ 3 หลักสูตรวิทยาศาสตร์บัณฑิต (หลักสูตรนานาชาติ) สาขาวิชาเคมีประยุกต์ ภาควิชาเคมี คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย และ Worcester Polytechnic Institute ได้จัดทำโครงการวิทยาศาสตร์และสังคมแบบปฏิสัมพันธ์ (Interactive Science and Social Project) ในปีการศึกษานี้ มีโครงการวิจัยจำนวน 9 โครงการ โดยหนึ่งในโครงการของปีการศึกษานี้ คือ ศึกษาค้นคว้าเกี่ยวกับการปฏิบัติทางการเกษตรที่ดี (GAP) เพื่อนำข้อมูลไปแนะนำวางแผนและให้ความรู้เพิ่มเติมแก่เกษตรกรในศูนย์ค้าคุณ อำเภออุบลรัตน์ จังหวัดขอนแก่น เพื่อให้เกษตรกรทำงานอย่างเป็นระบบและมีประสิทธิภาพมากยิ่งขึ้น

อาจารย์ที่ปรึกษา
ศาสตราจารย์ ดร. ศุภวรรณ ตันดยานนท์
อาจารย์โรสแมรี่ เทย์เลอร์





ศูนย์คำคุณ

KHAM KOON CENTER

ติดต่อเรา

ตำบล หุ่งโป่ง อำเภอบุบผา จังหวัดน่าน
พ.ศ. 40250

อีเมล

scdfkk@gmail.com

cuorganicfarm@gmail.com

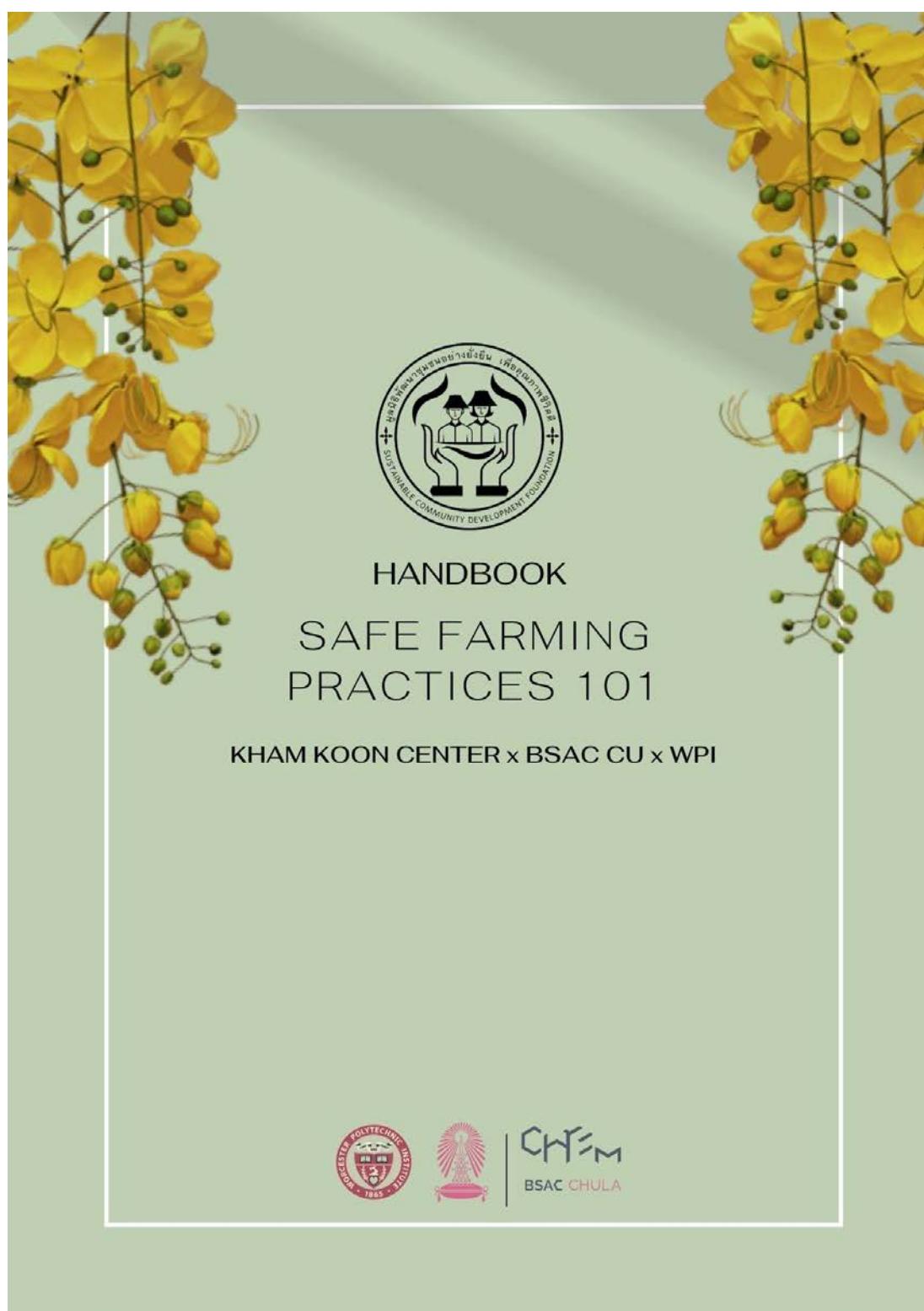
เว็บไซต์

<https://scdfoundation.weebly.com/>



สแกน คิวอาร์โค้ด เพื่อ
เปิดไฟล์หนังสือ ดิจิตอล

Appendix R - Handbook Final Draft (English)



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01 Good Agricultural Practices (GAP)	01
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• Benefits and Significance of GAP Standard	04
• Steps to Obtain GAP Standard Certification	05
• Documents Required for GAP Standard Application	06
• Examples of GAP Application Form	07
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• Significance of Obtaining PGS Certification	12
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GOOD AGRICULTURAL PRACTICES (GAP)

8 GAP REQUIREMENTS

01 WATER

The water source must come from an environment that does not cause contamination to the produce.



02 PLANTING AREA

Not in an close proximity to a facility whose practices that would contaminate produce (large factories, neighboring farms that use chemicals, etc.)



03 AGRICULTURAL HAZARDOUS SUBSTANCES

Stored in a clean, closed location and used in accordance with the Ministry of Agriculture



04 PRE-HARVEST PRODUCTION QUALITY MANAGEMENT

There is a production control plan in order to obtain quality output through using good agricultural practices



8 GAP REQUIREMENTS

05 HARVEST AND POST-HARVEST PRACTICES

Harvest produce at the correct time and uphold the quality according to the market demand



06 STORING PROCESS

Handling in the field and storage of produce are managed in a hygienic manner to prevent contamination that affects the safety of consumers.



07 PERSONAL HYGIENE

Workers must have knowledge and understanding of personal hygiene in order to be able to work hygienically



08 TRACEABILITY SYSTEM AND DATA RECORDING

There is a record of operational data, chemicals used, buyer information, and production quantities for the benefit of traceability



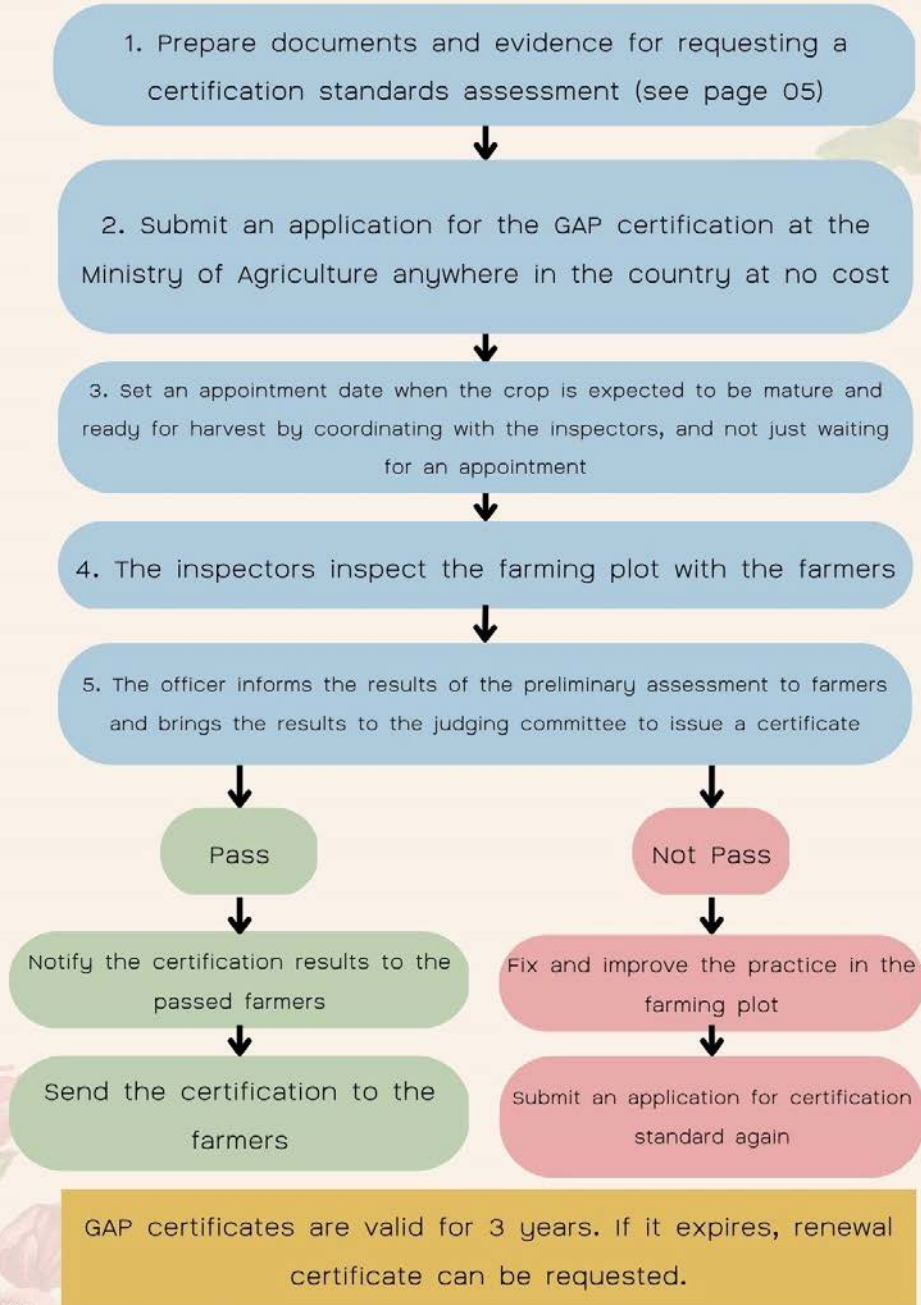
BENEFITS AND SIGNIFICANCE OF GAP STANDARD

1. Improving the knowledge and producing plants systematically can reduce costs and bring in higher income for farmers
2. Can help achieve high quality products that meet the standards and are safe from contamination, and have more market demand.
3. Reduce the use of chemicals, reduce pollution to the environment and reduce chemicals inhaled by the farmer.
4. Production certification and productivity is acceptable. Can build the confidence of producers and consumers, and allow products to be sold at higher price.
5. Improve the overall health of the community.



Source: <https://www.opsmoac.go.th/satun-manual-files-441891791816>

PROCEDURES FOR OBTAINING GAP STANDARD CERTIFICATE



DOCUMENTS REQUIRED FOR GAP APPLICATION

1. Documents required for GAP applications are;
 - Copy of farm owner's National ID
 - Application form (look at page x-x)
 - Copy of the land deed
2. Submit all the documents to the Ministry of Agriculture Office nearby or Department of Agriculture Extension around the country with no charge
3. Apply GAP standards in their farming practices
4. Cooperate with the official staff

Remark: in the case of a group application, the applicant needs to submit the copy of Authorized Registration Document on behalf of the juristic person

EXAMPLE OF GAP APPLICATION FORM PAGE 1



แบบคำขอใบรับรองแหล่งผลิต GAP พืช

(สำหรับรายเดี่ยว)

- ☐ มาตรฐานการปฏิบัติทางการเกษตรที่ดีสำหรับพืชอาหาร (มกษ. 9001-2556)
☐ มาตรฐานการปฏิบัติทางการเกษตรที่ดีสำหรับพืชสมุนไพร (มกษ. 3502-2561)
☐ มาตรฐานอื่นๆ (ระบุ).....

1. เกษตรกรเจ้าของฟาร์ม (นาย/นาง/นางสาว).....นามสกุล.....

เลขที่บัตรประจำตัวประชาชน []-[]-[]-[]-[]-[]-[]-[]-[]-[]

รหัสทะเบียนบ้าน - -

ที่อยู่ บ้านเลขที่ ชื่อหมู่บ้าน หมู่ที่

ถนน.....ตรอก/ซอย.....แขวง/ตำบล.....

เขต/อำเภอ จังหวัด รหัสไปรษณีย์

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โทรศัพท์ โทรศัพท์มือถือ

E-mail.....

2. นิติบุคคลเจ้าของฟาร์ม/ ชื่อนิติบุคคล

2. นิติบุคคลเจ้าของฟาร์ม/ ชื่อนิติบุคคล

ชื่อผู้มีอำนาจลงนามของนิติบุคคล (นาย/นาง/นางสาว)

เลขที่ทะเบียนนิติบุคคล - - -

หรือ เลขจดทะเบียนนิติบุคคล/เลขทะเบียนผู้เสียภาษี - - -

ที่อยู่ของนิติบุคคล บ้านเลขที่ _____ ชื่อหมู่บ้าน _____ หมู่ที่ _____

[illegible]

แขวง/ตำบล เขต/อำเภอ

จังหวัด.....รหัสไปรษณีย์.....

โทรศัพท์ โทรศัพท์มือถือ

E-mail

กรณีที่นิติบุคคลไม่ได้ดำเนินการผลิตพืชให้ระบุชื่อ-นามสกุลผู้ผลิต.....

เลขที่บัตรประจำตัวประชาชนผู้มีสิทธิ - - - -

3. ที่ตั้งฟาร์ม ชื่อหมู่บ้าน _____ หมู่ที่ _____ ถนน _____ ตรอก/ซอย _____

แขวง/ตำบล.....เขต/อำเภอ.....

จังหวัด.....

หมายเหตุ : กรณีเปลี่ยนแปลงที่อยู่ หรือหมายเลขโทรศัพท์โปรดแจ้งกลับกรมวิชาการเกษตรเพื่อประโยชน์ของท่าน

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ศูนย์คำคุณ

Kham Koon Center

EXAMPLE OF GAP APPLICATION FORM PAGE 2

4. ชนิดและพันธุ์พืชที่ขอรับการรับรอง

ชนิดพืช/ พันธุ์พืช	พื้นที่ (ไร่)	อายุพืช (วัน)	กรณีไม่ผล จำนวน (ต้น)	ระยะเวลา การผลิต (ระบุดือน)	คาดว่าจะเก็บ เกี่ยวผลผลิต (ระบุดือน)	ผลผลิตรวมที่ คาดว่าจะได้รับ ต่อปี	เลขประจำแปลง (กรอกโดยเจ้าหน้าที่ นายทะเบียนเท่านั้น)

หมายเหตุ : กรณีมีชนิดพืชมากกว่าตารางที่กำหนดไว้โปรดแนบข้อมูลเพิ่มเติม

5. แผนผังที่ตั้งแปลง แสดงเส้นทางคมนาคม และสถานที่สำคัญในบริเวณใกล้เคียง เพื่ออำนวยความสะดวกในการเดินทางไปยังแปลง


ทิศเหนือ

ทั้งนี้ข้าพเจ้าได้แนบ/แสดงเอกสารประกอบคำขอประกอบด้วย

- ☐ แสดงบัตรประชาชน และทะเบียนบ้านของเกษตรกร
- ☐ แนบหลักฐานการจดทะเบียนนิติบุคคล (กรณีนิติบุคคล)
- ☐ กรณีมอบอำนาจ แนบหนังสือมอบอำนาจ พร้อมสำเนาบัตรประชาชนของผู้มอบอำนาจ
- ☐ แนบสำเนาเอกสารสิทธิการใช้ประโยชน์ที่ดิน
- ☐ โฉนดที่ดิน ☐ น.ส.2 ☐ น.ส.3 ☐ น.ส.3.ก. ☐ ปส.23 ☐ ส.ป.ก.
- ☐ ก.ส.น.5 ☐ น.ค.3 ☐ ส.ค.1 ☐ เอกสารรับรองจากหน่วยงานที่เกี่ยวข้อง

เลขที่เอกสารสิทธิการใช้ประโยชน์ที่ดิน.....

เจ้าของกรรมสิทธิ์ที่ดิน ☐ เจ้าของ ☐ เช่า ☐ ได้รับอนุญาต ☐ อื่นๆ.....

- ☐ ใบอนุญาต/หนังสือสำคัญ กรณีการผลิตพืชสมุนไพรต้องได้รับอนุญาตผลิต (ปลูก) ตามกฎหมายที่เกี่ยวข้อง เช่น กัญชา กัญชง และอื่นๆ

☐ บันทึกเอกสารเพิ่มเติม.....

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EXAMPLE OF GAP APPLICATION FORM PAGE 3

6. ข้าพเจ้าขอให้คำรับรอง/ สัญญาว่า

- 1) แหล่งผลิตอยู่ในพื้นที่ที่ได้รับสิทธิครอบครองตามกฎหมาย หรือได้รับสิทธิใช้ประโยชน์จากเจ้าของที่ดิน
- 2) จะปฏิบัติตามหลักเกณฑ์และเงื่อนไขต่าง ๆ ที่หน่วยรับรองกรมวิชาการเกษตรกำหนด และที่จะมีการกำหนด และ/หรือแก้ไขเพิ่มเติมในภายหลัง
- 3) ยินยอมให้ข้อมูลเกี่ยวกับระบบการผลิต ตามที่ได้รับการร้องขอจากหน่วยรับรอง
- 4) ยินยอมให้หน่วยรับรองระบบงานหรือหน่วยรับรองระบบงานระดับสากลที่เกี่ยวข้องกับการรับรอง ดำเนินการสังเกตการณ์ การตรวจประเมินของกลุ่มผู้ตรวจประเมินของกรมวิชาการเกษตร ณ แหล่งผลิตของข้าพเจ้าตามที่ได้รับการร้องขอ
- 5) ยินยอมให้หน่วยรับรองเปิดเผย ชื่อ ที่อยู่ ที่ตั้งแหล่งผลิต และหมายเลขโทรศัพท์ที่สามารถติดต่อได้

ข้าพเจ้าขอรับรองว่าข้อมูลต่างๆ ที่ให้ไว้เป็นความจริงทุกประการ และได้รับเอกสารหลักเกณฑ์และเงื่อนไขที่เกี่ยวข้องกับการรับรองไว้เรียบร้อยแล้ว

ลงชื่อ.....เกษตรกร/นิติบุคคล

(.....)

วันที่.....

หมายเหตุ : กรณีมอบอำนาจ ต้องแนบหนังสือมอบอำนาจพร้อมติดอากรแสตมป์ (10 บาทถ้วน)

1. สำหรับเจ้าหน้าที่กรมส่งเสริมการเกษตร

ประเภทแปลง ☐ แปลงใหญ่ ☐ แปลงทั่วไป

ชื่อแปลงใหญ่.....วันที่ผ่านการประเมินเบื้องต้น.....

ลงชื่อ.....เจ้าหน้าที่กรมส่งเสริมการเกษตร

(.....)

วันที่.....

2. สำหรับเจ้าหน้าที่กรมวิชาการเกษตร

2.1 เอกสารประกอบคำขอ

- ☐ แสดงหลักฐานบัตรประชาชน และหลักฐานทะเบียนบ้านของเกษตรกร
- ☐ หลักฐานการจดทะเบียนนิติบุคคล (กรณีนิติบุคคล)
- ☐ หนังสือมอบอำนาจ พร้อมสำเนาบัตรประชาชนของผู้มอบอำนาจ
- ☐ สำเนาเอกสารสิทธิการใช้ประโยชน์ที่ดิน
- ☐ ใบอนุญาต/หนังสือสำคัญ กรณีการผลิตพืชสมุนไพรต้องได้รับอนุญาตผลิต (ปลูก) ตามกฎหมายที่เกี่ยวข้อง เช่น กัญชา กัญชง และอื่นๆ

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EXAMPLE OF GAP APPLICATION FORM PAGE 4

2.2 ขอบข่ายการรับรอง

- ☐ อยู่ในขอบข่ายที่กรมวิชาการเกษตรให้บริการ และสามารถรับคำขอได้
☐ ไม่อยู่ในขอบข่ายที่กรมวิชาการเกษตรให้บริการ และไม่สามารถรับคำขอได้

2.3 คุณสมบัติของผู้ยื่นคำขอ

- ☐ มีคุณสมบัติครบถ้วนตามที่กำหนด และสามารถรับคำขอได้
☐ ไม่มีคุณสมบัติครบถ้วนตามที่กำหนด และไม่สามารถรับคำขอได้

2.4 ผลการตรวจสอบเอกสารประกอบคำขอ

- ☐ ครบถ้วน
☐ ไม่ครบถ้วน ขอเอกสารเพิ่มเติม

☐ ไม่ถูกต้อง ระบุ.....

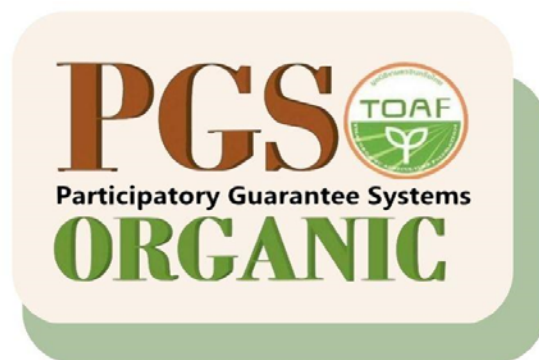
หมายเหตุ : ได้แจ้งให้ผู้ยื่นคำขอหรือผู้รับมอบอำนาจรับทราบแล้ว ซึ่งผู้ยื่นคำขอจะจัดส่งเอกสารดังกล่าวให้หน่วยรับรอง
กรมวิชาการเกษตร ภายในวันที่.....

ลงชื่อ.....ผู้ตรวจสอบคำขอ
(.....)

วันที่.....

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PARTICIPATORY
GUARANTEE SYSTEMS
(PGS)

WHAT IS PGS

PGS is...

a community-based organic certification system developed from the participation of local communities and social networks to exchange knowledge and learning experiences. It is an alternative to organic certification so that small farmers can access the market while promoting the domestic market, which is suitable for small farmers who are beginning to develop organic farming practices. This is a process suitable for local farmers that allows everyone in the local area to participate in setting the rules together.

01 IMPORTANCE OF PGS CERTIFICATION

- Helps organize the work
- Helps to develop sustainable communities and solve various problems
- Improves food and agriculture sustainability
- Increases income stability for the community
- Mobilizes communities against climate change
- Provides healthy food for producers and consumers
- Promotes economic growth in the community to produce enough products for sale

DIFFERENCE BETWEEN PGS AND GAP

PGS

- No chemicals used in any farming activities
- Always considers the environmental effects
- Maintains the balance of the ecosystem

GAP

- Can use some chemicals to get rid of pests/animals and cure disease but must take into account safety and proper use
- Can use some chemical fertilizers in production in the correct amount and follow the instruction on the label
- The produce must not contain chemical residues or be at a level that is not harmful to consumers

STEPS TO OBTAIN PGS CERTIFICATION

1. The PGS group selects the members to be their formal inspector and assigns judge committee for certification



2. Three inspectors go to the farm for inspection according to the evaluation list



3. Farmers submit traceability records, maps of the plot, crops types, livestock, the quantity of the produce, and their farming practice (look at page 14 – 15)



4. The inspectors submit the results to the meeting to evaluate them together where the judge committee signs their names for approval



PASS



cont. next page

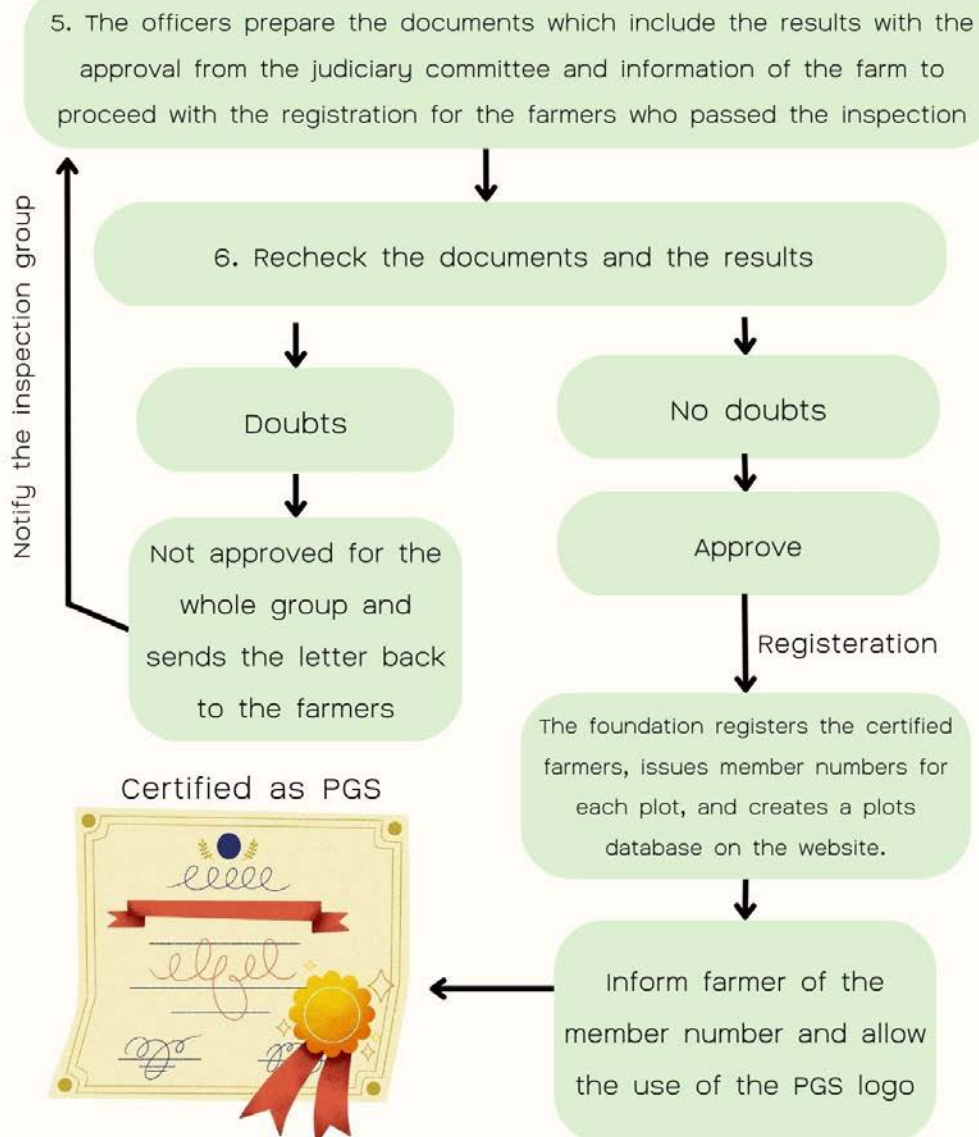


Not pass
(specify time period
to reapply)

Improve
farming
practices



STEPS TO OBTAIN PGS CERTIFICATION



DOCUMENTS REQUIRED FOR PGS APPLICATION

PGS Farmer Group

1. Participatory Guarantee System (PGS) and all group certification requirements such as production requirements, practices, regulations, group philosophy, and values
2. Manual
 - Group background
 - Member database
 - Structure of roles and responsibilities of directors
 - Farm audit methods and certification process
 - Certification process
 - Use of logos
 - Penalties for non-compliance with the rules
3. A contract for members to acknowledge and sign that they will comply with the requirements of the standards and rules of the group
4. Plot audit record and monitoring
5. Meeting notes and a list of all attendees
6. Certified person information
7. Record recommendations and improvements from consultants

DOCUMENTS FOR PGS APPLICATION

Farmers

1. Farm plan with serial number
2. Types of plants and pets and the amount of production per year
3. Management of soil, water, plant species, livestock, pest control, animals, organic fertilizers
4. Evidence of import showing sources such as fertilizer, seed, animal feed



RECOMMENDATIONS FOR PRACTICES



RECOMMENDATIONS FOR PRACTICES

COMMON MISTAKES AND SOLUTIONS

- THERE SHOULD BE A TRACEABILITY RECORD TO WRITE DOWN THE ACTIVITIES THAT OCCUR WITHIN THE PLOT AS WELL AS PICTURES OF THOSE ACTIVITIES.
- THERE MUST BE FULLY GROWN VEGETABLES IN THE PLOT ON THE DAY THE OFFICERS COME TO INSPECT BY PREDICTING THE GROWTH TIME OF THAT PLANT.
- THE FARMERS MUST BE PRESENT ON INSPECTION DAY.
- BEFORE MAKING AN APPOINTMENT WITH THE STAFF, THE FARMER MUST ENSURE THAT THE APPLICATION AND OTHER DOCUMENTS HAVE BEEN SUBMITTED. ALSO, THEY MUST PREDICT THE GROWTH TIME OF THAT PLANT THE STAFF WILL THEREFORE MAKE AN APPOINTMENT TO INSPECT THE CONVERSION. IF THEY ARE NOT SURE WHETHER YOU HAVE SUCCESSFULLY SUBMITTED THE DOCUMENTS OR NOT ASK THE COORDINATOR.
- PETS SHOULD NOT BE ALLOWED TO WALK IN THE FIELD OR NEAR THE PRODUCE.

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RECOMMENDATIONS FOR PEST MANAGEMENT

Integrated Pest Management (IPM)

Integrated Pest Management (IPM) is a process used to solve pest problems centered around long-term prevention of pests and their damage to the ecosystem. IPM is a way to reduce the use of pesticides to prevent harm to the environment and health.

Bio Extract

Mix neem leaves + tobacco leaves + fermented shallots for 1 night -> spray it into the plantation field



Sources:

IPM - <https://ipm.ucanr.edu/what-is-ipm/>

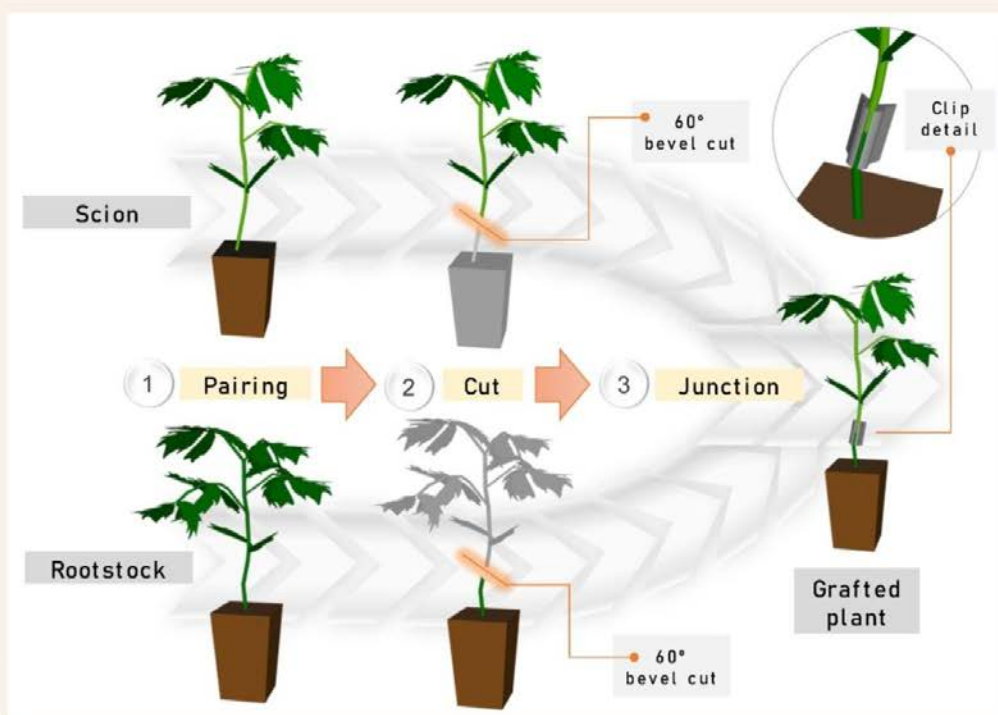
<http://www1a.biotec.or.th/Shrinfo/documents/BIOTEC%20for%20Farm%20Product.pdf>

20

RECOMMENDATIONS FOR PEST MANAGEMENT

Vegetable Grafting

Vegetable grafting is an IPM technique commonly used on tomato, watermelon, melon, eggplant, cucumber, and pepper. It is a process where a farmer can join cut pieces of two different plants to fuse it into a single plant. It involves bundling a scion and a rootstock. Once these are bundles, the plants can grow together at a union spot. The advantages are better resistance to pathogens, environmental stresses, and higher crop yields.



Sources:

Grafting – <https://extension.okstate.edu/fact-sheets/introduction-to-vegetable-grafting.html>

https://www.linkedin.com/pulse/grafting-vegetables-hassan-abu-nejim/?trk=read_related_article-card_title

RECOMMENDATIONS FOR PEST MANAGEMENT

Trap Crops

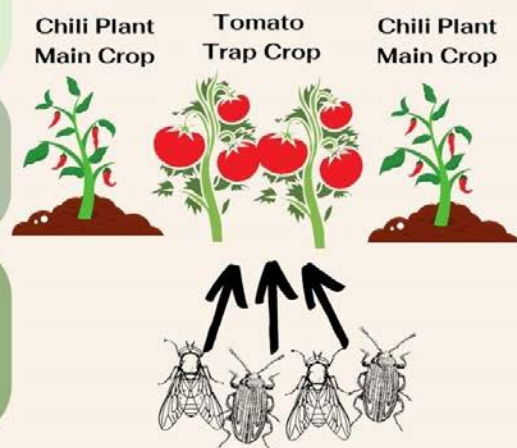
Trap crops are a tool used to protect crops by planting crops that are not going to be consumed beside the main crops. They are supposed to target pests so they attack the trap crops instead of cash crops. The farmer can also spray insecticides on the trap crops instead of the main crops, so the main crop does not have chemicals on it.

1. Plant the trap crop 2–3 weeks before the main crop

2. Plant the main crop

3. Plant new trap crops every 2–3 weeks while the main crop grows

4. If there is a sign of pests, spray insecticides on the trap crop, not the main crop, if necessary



Insects will attack the trap crop instead of the main crop

Sources:

Trap Cropping - <https://extension.uga.edu/publications/detail.html?number=C1118&title=trap-cropping-for-small-market-vegetable-growers>

RECOMMENDATIONS FOR PEST MANAGEMENT

Molasses Bottles

Molasses bottles are plastic bottles with molasses inside them that are hung up around the field and can trap insects that come to eat the molasses. These are useful for controlling the population of Diamondback Moths, Cabbage Loopers, Cabbage Webworms, and Common Cutworms. This technique is useful to protect cabbage and other vegetables.

How-to:

1. Fill plastic bottles with about 3cm of molasses.
2. Leave them open and hang them on bamboo shoots around the field that are about 10m apart.



Sources:

https://www.researchgate.net/publication/355113545_5_Simple_and_Effective_Integrated_Pest_Management_Technique_for_Vegetables_in_Northeast_Thailand

COMMON BIOPESTICIDES

Biopesticides are a certain type of pesticides made from natural materials, which makes them safer to use than regular pesticides.

To understand whether a biopesticide product is appropriate for a situation, **the label and any other manual should be read and fully understood.**

Use **high spray volumes** (400-1,000 L/ha) and **appropriate nozzles** for pressure. Treat the target pest at **frequent intervals** (seven days or less) to maintain protection.

Difference Between...

Biopesticides & Chemicals

Friendly to non-target species



Harmful to non-target species

Does not cause pollution



Causes a lot of pollution

Usually cheaper



Usually more expensive

Pests less likely to become resistant



Pests more likely to become resistant

Sources:

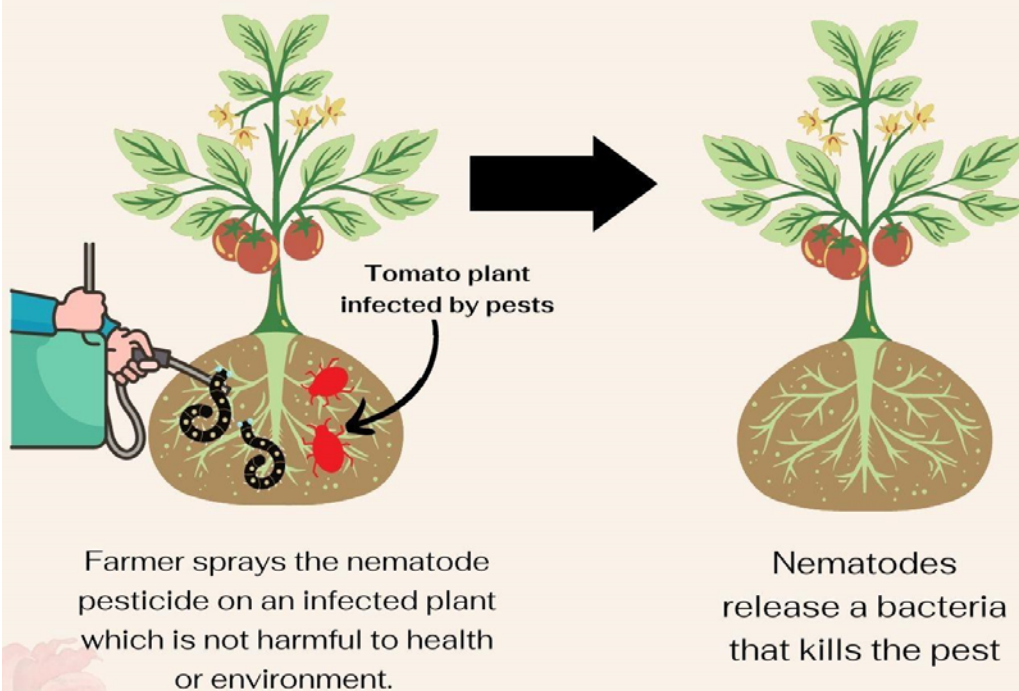
https://assets.publishing.service.gov.uk/media/57a08d4c40f0b652dd0018b8/R7299_FTR_anx2.pdf

<http://www1a.biotec.or.th/Shrinfo/documents/BIOTEC%20for%20Farm%20Product.pdf>

COMMON BIOPESTICIDES

Nematodes

Nematodes are round, microscopic worms used for insect control. They release bacteria which kills insects. They can be used against insects in soil, such as webworms, cutworms, army worms, and wood-borers. They can often be sprayed using agricultural equipment. They should be applied early in the morning or in the evening. Nematode pesticide, also known as *Steinernema carpocapsae*, are produced by the DOAE, which is used mainly on fruit trees. A common use for this method is for tomatoes.



Sources:

<https://ncceh.ca/documents/field-inquiry/nematodes-pest-control>
<https://www.tm.mahidol.ac.th/seameo/2015-46-4/03-638715.pdf>

COMMON BIOPESTICIDES

Trichoderma Harzianum

Trichoderma harzianum is the most widely produced local biopesticide in Thailand. It is used to control plant diseases and fungus such as **root rot** and **soft rot** in vegetables and **fruit trees**.



Bacillus thuringiensis (Bt)



Bt is a bacteria that can be used against **caterpillars** and similar insects. Some of the insects it can be used against are lepidoptera, leaf eating coleoptera, and mosquitos. Bt can be applied by hand sprayer and **protective gear is not required** when spraying it. It can be used up to the day of harvest since residues are **not harmful to humans or animals**.

Nuclear Polyhedrosis Virus (NPV)

NPV is another biopesticide that is sometimes used alongside Bt. NPV is most effective against **small larvae** and is proven to work against the *Spodoptera* moth in grapes and larvae in silk. NPV is also **not harmful to beneficial insects**.



Sources: https://vric.ucdavis.edu/pdf/pests_BtCaterpillarControl.pdf

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RECOMMENDATIONS FOR MANURE

Quality Testing

Farmers can put worms into the cow manure to check the quality of the cow manure. If the worms die, it means that the cow manure is of bad quality.

Improving Feed Quality

Farmers can feed their chickens, ducks, cows, and pigs chemical-free feed such as leftover vegetables, rice bran, banana, or other nutrient-filled foods to improve the quality of the manure.





TRACEABILITY RECORDS

Traceability records help save details and operations on plots. They also promote efficiency in producing agricultural products with quality, which meet the standards and the needs of consumers. This includes developing a system for quality assurance of products and production processes to ensure quality and safety for consumers.

01 WHY IS TRACEABILITY RECORD IMPORTANT?

- Helps organize the work
- Able to trace the information in case of a problem or disease outbreak. Item can be traced back and the problem can be fixed before anyone consumes product
- Helps to remember important information about products better when taking notes
- Allows the consumers to trace their food
- Enhances confidence in the safety of produce
- Can be used as evidence when applying for a certificate of different standards

TRACEABILITY RECORD

02 HOW TO RECORD IMPORTANT INFORMATION

1. Actual practice data must be recorded
2. Areas and Planting date
3. Cultivation practices
4. Soil management
5. Source of production factors
6. Pest prevention and elimination
7. Harvest date
8. Amount of crops per acre
9. Photos of every step of planting
10. Information of the buyer of the produce or the source of the produce to be sold
11. Keeping production records for at least 2 years

Remarks :

1. The notebook should be sturdy, not torn easily/not at risk of being lost.
 2. Must be recorded continuously every year
-

EXAMPLE OF TRACEABILITY RECORD

บันทึกการปฏิบัติทางเกษตรที่ดี (GAP)										
เดือน		พ.ศ.								
แปลงที่		ชื่อพืช/พันธุ์พืช								
วันที่	กิจกรรมในแปลง	การใส่ปุ๋ย	การให้น้ำ	การกำจัดวัชพืช	ตัดแต่งกิ่ง	การสำรวจโรค/แมลง/ศัตรูพืช	การกำจัดโรคและแมลงศัตรูพืช	ท่าความสะอาดภาชนะก่อน/หลังการเก็บเกี่ยวและล้างภาชนะก่อนนำส่ง	จำนวนผลผลิตที่เก็บได้ (กก.)	ราคาผลผลิต (บาท)/(กก.)
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หมายเหตุ : 1. ใส่เครื่องหมาย ✓ ในช่องตามกิจกรรมที่ปฏิบัติ
2. ระบุจำนวนและน้ำหนักผลผลิตโดยประมาณที่เก็บเกี่ยวได้ (กก.)

บันทึกเพิ่มเติม : (เช่น ชื่อผู้ปลูก ผสมดินแอมโมเนียหรือสูตรอาหารจากบ้านใด)

Kham Koon Center

บันทึกเพิ่มเติม:

[illegible]

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Additional Resources

- <https://warning.acfs.go.th/th/articles-and-research/view/?page=34>
- <https://www.opsmoac.go.th/satun-manual-files-441891791816>
- https://gap.doa.go.th/web_manual/doc/F/F-1.pdf
- <https://www.pgs-organic.org/sub1content.asp?id=14294>
- <https://www.pgs-organic.org/sub1content.asp?id=14302>
- <http://www.clinictech.ops.go.th/online/filemanager/fileclinic/F1/files/pgs-manual.pdf>
- <https://thfarmers.com/การทำปุ๋ยคอก/>
- <https://shop.grotech.co/blog/ipm-การจัดการศัตรูพืชแบบผสม/>
- <https://extension.uga.edu/publications/detail.html?number=C1118&title=trap-cropping-for-small-market-vegetable-growers>
- https://www.researchgate.net/publication/355113545_5_Simple_and_Effective_Integrated_Pest_Management_Technique_for_Vegetables_in_Northeast_Thailand
- https://assets.publishing.service.gov.uk/media/57a08d4c40f0b652dd0018b8/R7299_FTR_anx2.pdf
- <http://www1a.biotec.or.th/Shrinfo/documents/BIOTEC%20for%20Farm%20Product.pdf>
- https://vric.ucdavis.edu/pdf/pests_BtCaterpillarControl.pdf
- <https://qsds.go.th/dsssilk/wp-content/uploads/sites/122/2021/07/GAP.pdf>

About Us

Dr. Tantip Thamrongvarangoon MD.

Head of Kham Koon Center

Dr. Tantip has an interest in community health and a desire to improve the well-being of the people. She quickly realized that the root of the health problems comes from what people consume in their daily life. Hence, she collaborated with many organizations to promote the safe use of chemicals in the agricultural sectors for both consumers and producers. She encourages local farmers to obtain GAP certification to verify their product quality.



Students

Napatsorn	Chadanuntakul
Sophia	Islam
Sophia	Mularoni
Pakkarin	Putpongphaew
Theresa	Rosato
Yavitha	Siri-u-vithtaya
Surangkana	Srichantamit
Joelis	Velez Diaz

This academic year, students in their third year of the Bachelor of Science Program (International Program) from Chulalongkorn University's Department of Chemistry, Faculty of Science, and Worcester Polytechnic Institute collaborated to create an interactive Science and Social Project. There are 9 research projects in the works. One of this academic year's projects is to study and research Good Agricultural Practices (GAP) to educate, guide and provide additional information to farmers of the Kham Koon Center at Ubon Rat District, Khon Kaen, to encourage farmers to work more systematically and efficiently.

Advisors

Professor Rosemary Taylor

Professor Dr. Supawan Tantayanon





ศูนย์คำคุณ

KHAM KOON CENTER

CONTACT US

ตำบล หุ่งโป่ง อำเภอลำลูกเกด
ขอนแก่น 40250

Email

scdfkk@gmail.com

cuorganicfarm@gmail.com

gr-organicfarmteam@wpi.edu

Website

<https://scdfoundation.weebly.com/>



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