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ภูมิปัญญาการปลูกมันคอนโด: การเปรียบเทียบการปลูกมันสำปะหลังโดยใช้ปุ๋ยธรรมชาติและปุ๋ยเคมี

Traditional knowledge of Mun Condo cultivation: Comparison of cassava cultivation using natural and chemical fertilizers

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บทคัดย่อ

งานวิจัยครั้งนี้ดำเนินการในพื้นที่อำเภออู่ทองและอำเภอดอนเจดีย์ จังหวัดสุพรรณบุรี ผลวิจัยพบว่าศูนย์จัดการศัตรูพืชชุมชนของแต่ละอำเภอมีบทบาทในการถ่ายทอดเทคนิคการปลูกที่เรียกว่ามันคอนโด เพื่อที่จะกระตุ้นให้เกษตรกรเพิ่มผลผลิตของตนเอง เทคนิคการปลูกมันได้ถูกเผยแพร่ในกลุ่มเกษตรกรจังหวัดสุพรรณบุรีและที่อื่น ๆ วิธีการปลูกมันสำปะหลังโดยการใช้ปุ๋ยธรรมชาติให้ผลผลิตที่มากกว่าวิธีการปลูกมันสำปะหลังโดยการใช้ปุ๋ยเคมี ปัญหาหลักของการส่งออกมันสำปะหลังไทยคือการกีดกันทางการค้าของบางประเทศ

คำสำคัญ : วิธีการปลูกมันคอนโด การปลูกมันสำปะหลัง ปุ๋ยธรรมชาติ ปุ๋ยเคมี

ABSTRACT

This research was conducted in Uthong and Don Chedi Districts, Suphanburi Province. Research results indicate that community centers for plant pest control in each district play a role as transmission centers for Mun Condo planting techniques in order to encourage farmers to increase their yields. Those techniques have become widely spread among farmers in Suphanburi and other provinces in the region. Cassava cultivation using natural fertilizer gave greater yield than using chemical fertilizer. Trade barriers in some countries is the main problem with the export of Thai cassava. The main problem of cassava exporting is the trade barriers in some countries.

Keywords: Mun Condo planting techniques, cassava cultivation, fertilizer

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Introduction

Manihot esculenta (commonly called cassava), which is native to South America, is a woody shrub of the family Euphorbiaceous. It is extensively cultivated as an annual crop in tropical and subtropical regions for its edible starchy tuberous root, a major source of carbohydrates. Cassava is the third largest source of food carbohydrates in the tropics, after rice and maize. It is a major staple food in the developing world, providing a basic diet for over half a billion people (Olsen & Schaal, 1999). Cassava can be made into an alcoholic beverage, ethanol biofuel, animal feed, laundry products, flour and medicinal products (Opie, 2008). Cassava plays a particularly important role in agriculture in developing countries, especially in sub-Saharan Africa, because it does well on poor soils and with low rainfall, and because it is a perennial that can be harvested as required. Its wide harvesting allows it to act as a famine reserve and is invaluable in managing labor schedules. It offers flexibility to resource-poor farmers because it serves as either a substance or a cash crop (Stone, 2002). At present, Nigeria is the world's largest producer of cassava, while Thailand is largest exporter of dried cassava. Farmers living in Suphanburi Province use a Mun Condo planting technique for cassava cultivation in order to increase their yields. Thus, given the importance of the crop to the national economy, the researchers designed this study to learn more about the traditional knowledge used in central Thai cassava cultivation.

Research Objectives

There were four objectives for this study: 1) To study the traditional knowledge used in the Mun Condo planting technique of cassava farmers in Suphanburi Province; 2) To study the situations and difficulties of cassava cultivation among farmers in Suphanburi Province; 3) To compare the total yield per rai between a Mun Condo planting technique using chemical fertilizers and a Mun Condo planting technique using natural fertilizers in Suphanburi Province; 4) To study the transfer of Mun Condo planting techniques among farmers in Suphanburi Province.

Literature review

Cassava is a staple crop that has transformed the economies, and diets, of many cultures around the world (Nweke, Spencer & Lynam, 2002). Cassava is now a vital component in the livelihoods of millions of farmers and traders (Hillocks, Thresh & Bellotti, 2002). The importance of the crop is reflected in the number and scope of ongoing studies to improve its cultivation. Mkamilo and Jeremiah (2005) conducted an investigation into the current status of the Cassava Improvement Programme in Tanzania. The findings indicated that various research institutes in the country continue to evaluate cassava varieties for root yield, dry matter content, consumer preferences and tolerance/resistance to biotic stress factors such as insect pests and diseases. The programme is also concerned with multiplication of planting materials of improved varieties, small scale cassava processing and studies of virus diseases.

In Thailand, cassava is considered one of the most important economic crops with annual production of around 25 million tons. Kuakoon Piyachomkwan and Morakot Tanticharoen (2011) studied the prospects of the cassava industry in Thailand. The findings indicated that cassava is grown not only as a subsistence crop by small farmers, but also as an

agro-industrial crop with a well-developed industry and market. The starch-rich roots of cassava have been used as a raw material for producing a lot of high value-added products. More recently, cassava has been developed as an energy crop, producing bioethanol as an alternative fuel. It has also spawned a number of other industries and developed existing sectors of the economy, such as transport and distribution (Timaboot & Suthikarnnarunai, 2017).

While agriculture in Thailand is developing at a rapid rate, many local farmers continue to base their practices on traditional methods. Georgia Elgar (2013) conducted research into the dissemination of traditional agricultural methods and examined youth involvement in international agriculture. The findings indicated that while traditional knowledge is transferred largely through an intergenerational learning chain, traditional knowledge is not an end goal in itself. Instead it is a tool that can be used to maintain economically, culturally, and environmentally sustainable agricultural systems. Meanwhile, Anan Polthannee (2010) analysed indigenous agricultural knowledge and practice in Northeastern Thailand. The findings of his investigation indicated that local farmers have learned to understand their environment, which includes physical, biological and socio-economic and site-specific factors. They have adapted their practices or their indigenous agricultural knowledge to improve crop yield and household income. Indigenous agricultural knowledge is an immensely valuable resource that provides farmer-to-farmer training or local technology transfer. However, it is important that the traditional knowledge is also adapted to make light of new scientific developments and research.

The development of traditional agriculture has been analysed by Rogers (1962) in his work on the diffusion of innovations. Rogers insisted that there are five groups of people who contribute to the development and adaptation of an innovation. According to Rogers, the first group, 'the innovators', create the new system. The innovation is then improved by a small group of usually young educated 'early adapters'. The idea catches on among more conservative members of society who remain open to new ideas and an 'early majority' of users help fine-tune the idea. Following the success of the system, a 'late majority' of older, more staunchly conservative people take up the innovation. Finally, older 'laggards' who are more traditionally resistant to change get on board with the idea.

These studies concerning agricultural knowledge and cassava cultivation reflect the situation of cassava farming both at a domestic and an international level. They will be used for discussing the findings of the present study.

Research methodology

In Thailand, cassava is planted using various methods, including horizontal, vertical and inclined. Prior research has found vertical planting of cassava to generate the highest yield, which is why the researchers selected a vertical planting method for examination in this study (Sinthuprama & Tiraporn, 1984). Fertilizers are vital to the success of long-term cassava farming. Research has found that insufficient use of fertilizers on cassava crops causes soil erosion and deterioration of soil quality (Sittibusaya et at. 1987). From 1975-1999, the effects of cassava fertilization were studied in Khon Kaen and Rayong Provinces. The findings showed that, without fertilizer application,

cassava yields decline over time. The omission of potassium reduced cassava yields more than the omission of either phosphorus or nitrogen, while the annual incorporation of cassava tops after harvest resulted in a marked increase in cassava yields, especially in the absence of chemical fertilizers. The combined application of complete chemical fertilizers with municipal compost tended to result in the highest cassava yields. “Based on these results, cassava growers have been recommended to apply chemical fertilizers that are high in potassium and nitrogen, and low in phosphorus, such as compound fertilizers in the ratio of 2:1:2 or 2:1:3.” (Tongglum, Suriyapan & Howeler, 2001). As the researchers were made aware of a local preference for natural fertilizers in Suphanburi Province, they wished to examine the area closer to determine whether there was any scientific accuracy behind the preference or whether it was a result of the continuation of traditional knowledge.

A qualitative research method was used to focus on understanding, interpreting, and analyzing the data in order to find the relations between the research objectives and the contextual environment. A purposive sampling technique was used to select three sample groups in Uthong District and Don Chedi District, Suphanburi Province. The sample of 49 people consisted of 5 key informants, 20 casual informants and 24 general informants. Research methods used for this research were basic surveys, interviews, observations and focus group discussions. Research data were collected by means of a documentary study and a field study. All the data concerning the research objectives were collected, examined, and categorized according to the aims of the study. Data derived from all data collection methods were validated through a triangulation technique and then classified into four categories according to the research objectives. The data were analysed by both typological and inductive analyses. A descriptive analysis was used for reporting the results. All the research objectives were presented through multimedia covering all the elements such as phenomenon, causal conditions, context, intervening conditions, action strategies and consequences.

Results

Cassava farmers in Suphanburi Province use a planting technique called the Mun Condo Planting Technique. The Mun Condo Planting Technique is an agricultural method focused on a high yield of cassava. The key concept is to increase cassava production, which originates from nodes of cassava stem cuttings. Every stem cutting must be cut at its node in order to increase the number of plants, which sprout from the nodes when planted in the ground. The cassava roots from these plants are very rich in starch and contain significant amounts of calcium, phosphorus, and vitamin C.

This method of cassava farming in Suphanburi Province was derived from traditional agricultural knowledge training at the community center of plant pest control in each district. The main difficulties for the cassava farmers in Suphanburi Province are the continuously high cost of cassava cultivation. Additionally, some countries have trade-barrier policies to protect their domestic produce, which hinders Thai cassava exports. Seasonal droughts are also a threat to cassava production in Thailand. These problems hinder both cassava production and export.

As for the comparison of a total yield per rai between a Mun Condo Planting Technique using

natural fertilizer and using chemical fertilizer, it was found that the Mun Condo Planting Technique using natural fertilizer gave an average yield of 18.4 tons per rai, which was larger than that from the Mun Condo Planting Technique using chemical fertilizer, which gave an average yield of 16.3 tons per rai (Table 1).

Discussion

The Mun Condo Planting Technique is an agricultural method focused on increasing cassava yield by ensuring every stem is cut at the nodes. According to Kuakoon Piyachomkwan and Morakot Tanticharoen (2011), it is the best method for exploiting the high mineral content of the cassava roots. The results of their investigation into the prospects of the cassava industry in Thailand indicated that the starch-rich roots of cassava have been used as a raw material for producing a lot of high value-added products and it also has been developed as an energy crop producing bioethanol as alternative fuel. The Mun Condo Planting Technique thus has a significant benefit for many industries in Thailand.

Table 1. The comparison of total yield per rai between both Mun Condo Planting Techniques

Mun Condo Planting Technique	Average yield per rai (tons)
Mun Condo using natural fertilizer	18.4
Mun Condo using chemical fertilizer	16.3

The community center of plant pest control in each district played a role as a knowledge transmission center, disseminating knowledge concerning Mun Condo Planting Techniques to interested people. Most farmers living in Uthong District and Don Chedi District were trained in cassava production techniques from the community center of plant pest control where they lived in. The transmission process of cassava production techniques is illustrated in figure 1.

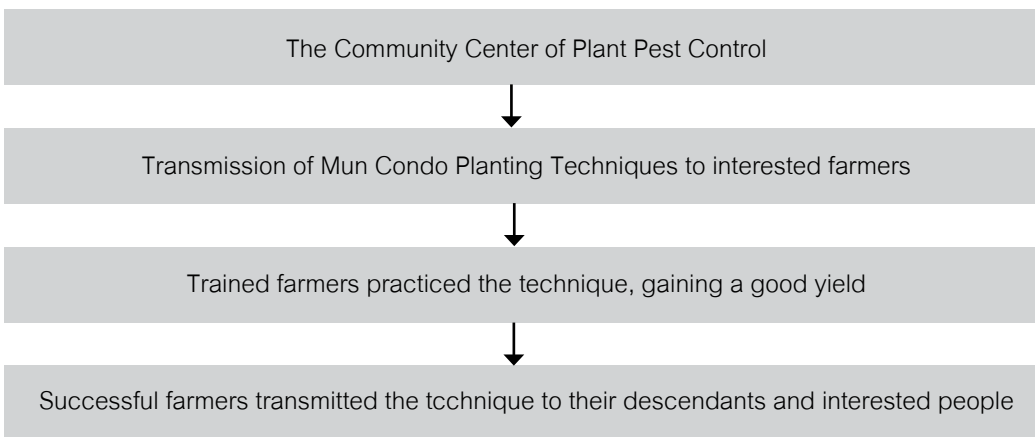
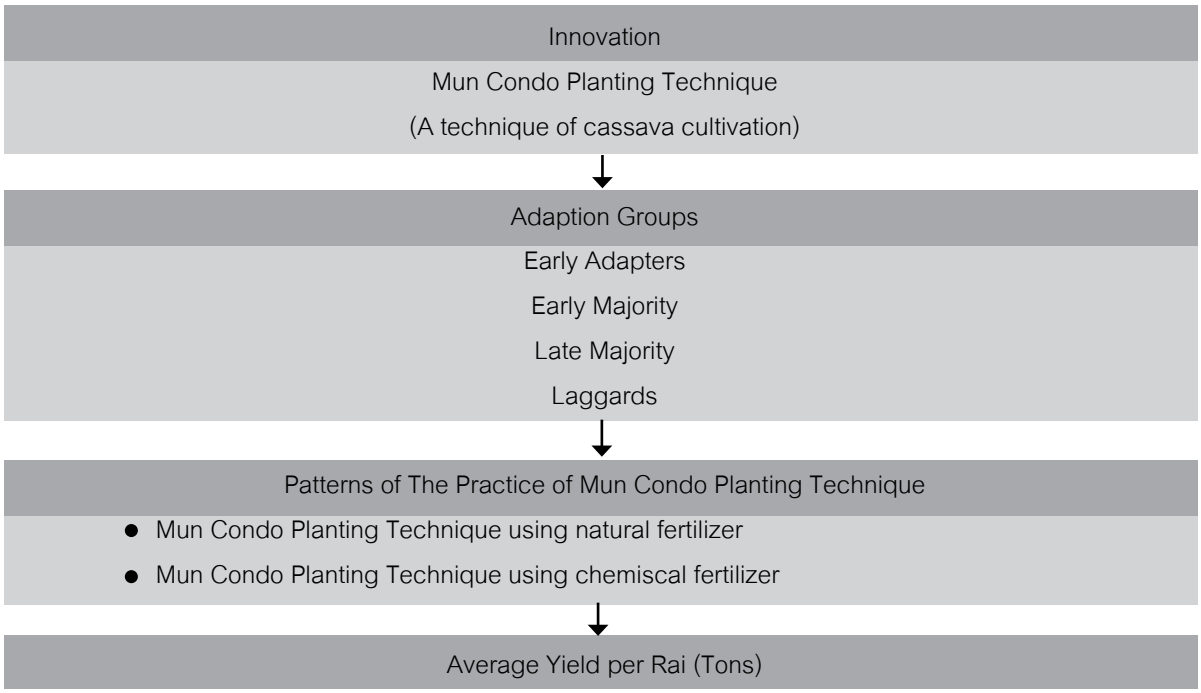


Figure 1. The transmission of Mun Condo Planting Technique.

As for the results of the total yield per rai between the Mun Condo Planting Technique using natural fertilizer and that using chemical fertilizer, it has been indicated that natural fertilizer gives an average yield higher than that from chemical fertilizer, which is different to research results from previous studies in Khon Kaen and Rayong (Tongglum, Suriyapan & Howeler, 2001). Therefore, farmers in the research area tended to favour the natural fertilizer because it can reduce production costs and it is also environmentally friendly.

In this case, the community centers of plant pest control in each district are the main learning and training centers to transfer this cassava planting technique to farmers and other people. Learning by doing is the best learning approach so each center provides experimental patches for trainees in order to practice the Mun Condo Planting Technique using both natural and chemical fertilizers. The empirical evidence from the centers will help the trainees to select the appropriate technique for cassava production. This is consistent with the research results of Anan Polthanee (2010), which concluded that farmers have learned to understand their environment which includes physical, biological, socio-economic and site-specific factors. They have adapted their practices to improve crop yield and household income. It is also consistent with Georgia Elgar (2013) who suggested that traditional knowledge is not an end goal in itself, rather a tool, among many, which can be used to maintain economically, culturally, and environmentally sustainable agricultural systems.

The development of traditional agriculture in Suphanburi Province has followed a similar pattern to that outlined by Rogers (1962) in his work on the diffusion of innovations. Rogers insisted that there are five groups of people who contribute to the development and adaptation of an innovation. If applied to the development of the Mun Condo Planting Technique, Rogers' 'innovators' were the prosperous, well-educated farmers of larger plots who created the new system. The 'early adapters' were less prosperous, young community leaders who saw potential in the techniques and helped to adapt and popularise it using their influence in the communities. Those members of the local community who remained open to new ideas formed the 'early majority' of users, before a 'late majority' of older, more staunchly conservative people began to use the cassava planting technique. Finally, older 'laggards' who were more traditionally resistant to change began to use the new method (Figure 2).



- Innovators: had larger farms, were more cducated, more educated, more prosperous and more risk-oriented.
- Early Adapters: younger, more educated, tended to be community leader, less prosperous.
- Early Majority: more conservative but open to new ideas,active in community and influence to neighbors.
- Late Majority: older, less educated, fairly conservative and less socially active.
- Laggards: very conservative, had small farm and capital, oldest and teast educated.

Source: Adapted from Rogers, E.M. (1962). *Diffusion of innovations*. New York, NY: Simon and Schuster.

Figure 2. An adapted model of Rogers' diffusion of innovations theory, applied to the development of the Mun Condo Planting Technique.

Conclusion

The results of Mun Condo Planting Techniques used by farmers living in Uthong District and Don Chedi District of Suphanburi Province is a good case study that reflects an appropriate way to increase both cassava production and family income. Thus, other farmers or persons concerned can adapt it for their cassava production. The results indicated that natural fertilizer gives an average yield higher than that from chemical fertilizer, which, when compared to previous research, suggests that a location specific model is required when designing an optimum growing procedure.

Recommendations

Based on the results of this study, the researchers wish to make a number of recommendations. The Mun Condo Planting Technique should be transferred to farmers who grow or plant cassava in all parts of Thailand because it benefits farmers with both an increase in cassava produce and an increase in family income. Thus, a community center of agricultural knowledge transfer should be established in every community. As for other problems, such as trade barriers, drought and external factors, all sectors in the country should cooperate to search for ways to solve them, both as policy and in practice. The state sector must play a role as an agent of change.

References

Elgar, G. (2103). *Transmission of traditional agricultural knowledge: Intergenerational or international?* Examining Youth Involvement in Agriculture. Retrieved January 12, 2016, from http://digitalcollection.sit.edu/isp_collection

Hillocks, R. J., Thresh, J. M. & Bellotti, A. (Eds.). (2002). *Cassava: Biology, production and utilization.* Oxford: CABI.

Mkamilo, G. S. & Jeremiah, S. C. (2005). Current status of cassava improvement programme in Tanzania. *African Crop Science Conference Proceedings, 7(2)*, pp.1311-1314.

Nweke, F. I., Spencer, D. S. & Lynam, J. K. (2002). *The cassava transformation: Africa's best-kept secret.* Michigan: Michigan State University Press.

Olsen, K. M. & Schaal, B. A. (1999). "Evidence on the origin of cassava: Phytogeography of Manihot Esculenta. *Proceedings of the National Academy of Science of the United States of America, 96(10)*, pp. 5586-91.

Opie, F. D. (2008). *Hog and Hominy: Soul food from Africa to America.* New York: Columbia Press.

Piyachomkwan, K. & Tanticharoen, M. (2011). Cassava industry in Thailand: Prospects. *The Journal of the Royal Institute of Thailand, 3(1)*, pp.160-170.

Polthannee, A. (2010). *Indigenous agricultural knowledge: A sample of practice in Northeast Thailand.* IJERD, *1(1),* pp. 68-73.

Rogers, E. M. (1962). *Diffusion of Innovations.* New York, NY: Simon and Schuster.

Sinthurama, S. & Thiraporn, C. (1984). Improving the productivity of cassava in Thailand. In *Cassava in Asia, its potential and research development needs. Proceedings of a regional workshop held in Bangkok, Thailand, June 5-8,* 1984, pp. 287-297.

Sittibusaya, C., Narkviroj, C. & Tunmaphirom, D. (1987). *Cassava soils research in Thailand. In Howeler, R. H. and Kawano, K. (Eds.). Cassava breeding and agronomy research in Asia. Proceedings of the 2nd Regional Workshop, held in Rayong, Thailand, October 26-28,* 1987, pp.145-156.

Stone, G. D. (2002). *Both sides now. Current Anthropology, 43(3)*, pp. 611-630.

Timaboot, W. & Suthikarnnarunai, N. (2017). Designing the distribution network in a cassava supply chain in Thailand. *Marketing and Branding Research, 4(2)*, p. 206.

Tongglum, A., Suriyapan, P. & Howeler, R. H. (2001). *Cassava agronomy research and adoption of improved practices in Thailand: Major achievements during the past 35 years.* In: Howeler, R. H. & Tan, S.L. (Eds.). *Cassava`s potential in Asia in the 21st Century: Present situation and future research and development needs: Proceedings of the sixth Regional workshop, held in Ho Chi Minh City, Vietnam, Feb. 21-25, 2000.* Centro Internacional de Agricultura Tropical (CIAT), Cassava Office for Asia, Bangkok, TH. pp. 228-258.