

## PRELIMINARY STUDY ON SACHA INCHI (*KYAL PE, PLUKENETIA*) CULTIVATION IN THAHTON TOWNSHIP

Ohnmar Thein<sup>1</sup>, Khin Toe Toe Lwin<sup>2</sup>, Myint Thida<sup>3</sup>, Khin Khin Moe<sup>4</sup>,  
Kyu Kyu Win<sup>5</sup>, Zaw Min Htun<sup>6</sup>

### Abstract

This paper tries to present Sacha Inchi (*kyalpe, plukenetia*) cultivation in Thahton Township from economic and geographical point of view. Sacha Inchi (*kyalpe, plukenetia*) cultivation was started in 2016 and local people are interested to cultivate it due to low investment, health benefit, less risk, etc. Although it is a perennial plant, economic return is available 8 months after harvesting. Sacha Inchi (*kyalpe, plukenetia*) cultivation costs only in the starting period and then, local people cost less in the later years. But, Sacha Inchi is not successful in Thahton Township due to change in market demand and price fluctuation. The objectives of the paper are to share health knowledge and characteristics of Sacha Inchi, to examine spatial distribution of Sacha Inchi (*kyalpe, plukenetia*) cultivation, to explore factors supporting Sacha Inchi (*kyalpe, plukenetia*) cultivation, and to predict future prospects of Sacha Inchi (*kyalpe, plukenetia*) cultivation. The primary data will be mainly applied and SWOT analysis will be used.

**Keywords:** Sacha Inchi (*kyalpe, plukenetia*) cultivation, health benefit, economic return, demand, costs.

### Introduction

Sacha Inchi (*Plukenetiavolubilis*) is a perennial plant that is native to South America and may be called by a number of names, including Inca Peanut and Mountain Peanut. For hundreds of years, it has been cultivated in South America by indigenous people. These plants are also widely grown in Southeast Asia.

Sacha Inchi is a very unique crop in that one acre of properly tended plants will yield 2 harvests a year, and the plants will last 20-30 years. Sacha Inchi seeds are packed with nutrients, including monounsaturated and polyunsaturated fats, as well as protein, vitamin E, dietary fibre, potassium, calcium, magnesium, vitamin A and various other antioxidants. Sacha

Inchi seeds do contain a high level of calories. Sacha Inchi is said to offer a variety of health benefits, with its oil a rich source of Vitamin E and a sustainable form of omega-3 fatty acids). Health benefits of Sacha Inchi protein powder are lowering bad cholesterol level, improving well-being, promoting weight loss, supporting mental health, helping with diabetes, improving joint health and enhancing healthy skin and hair.

In Thailand, it is consumed as snacks, organic oils, roasted organic nut, etc and it is used as pounder. In Myanmar, body lotion, soap, roasted Sacha Inchi seeds, hair care tonic, eye cream, edibleoil, night cream, day cream, toner, etc are made by Sacha Inchi seeds. Moreover, husk of Sacha Inchi seeds are used instead of tea leaves to drinks green tea. Some local people used dried Sacha Inchi leaves instead of tea leaves to drink with hot water.

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<sup>1</sup> Dr, Associate Professor, Department of Geography, Hpa-an University

<sup>2</sup> Lecturer, Department of Geography, Hpa-an University

<sup>3</sup> Professor, Department of Geography, Hpa-an University

<sup>4</sup> Lecturer, Department of Geography, Hpa-an University

<sup>5</sup> Lecturer, Department of Geography, Hpa-an University

<sup>6</sup> Assistant Lecturer, Department of Geography, Hpa-an University

The existing climate and soils of Thahton Township are very suitable for growing Star Sacha Inchi in Myanmar. Like other areas in Myanmar, agriculture is major pillar for the economy of Thahton Township and perennial and annual crops are widely grown. In Thahton Township, although farmers extensively cultivated Sacha Inchi last 5 years, it's cultivated areas decreased due to high labour cost, fluctuation of price and low market demand.

To present Sacha Inchi cultivation and the reasons reducing cultivated area from the geographical point of view, Thahton Township was selected.

### **Study area**

Thahton Township is located in Thahton District, it is one of the ten townships that constitutes Mon State. The area of Thahton Township is 1,393.17 sq. km (537.18 square miles). Thahton Township is composed of 5 wards, 49 village tracts and 196 villages. Agriculture is major economy and annual and perennial crops are widely grown.

### **Objectives of the paper are**

- To share health knowledge and characteristics of Sacha Inchi
- To examine spatial distribution of Sacha Inchi (*kyalpe, plukenetia*) cultivation,
- To explore factors supporting Sacha Inchi (*kyalpe, plukenetia*) cultivation,
- To predict future prospect on Sacha Inchi cultivation

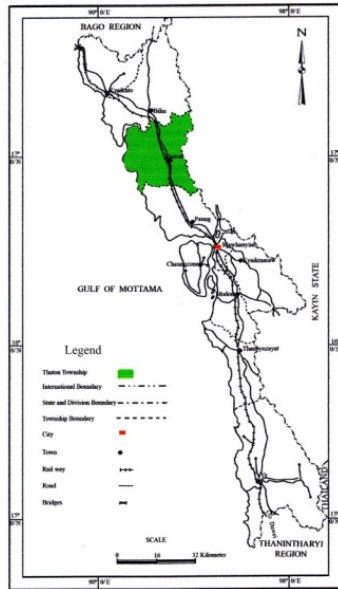
### **Materials and methods**

Sacha Inchi cultivation is now in starting period and secondary data on cultivated area and production are unavailable from Departments concerned. Primary data: cultivation method, price, demand, risk, labour requirement, uses in Myanmar were collected through field survey, discussion with farm owners, agriculture staffs and labour of Sacha Inchi cultivation. Moreover, interviews with manufacturers were done. Therefore, to present the paper, primary data collected by research team were mainly used. Research team collected primary data on cultivated area and production from 10 village tracts of Thahton Township to present the paper from geographical point of view. Secondary data are obtained from department concerned, on line source, health journals, etc.

## **Results and Finding**

### **Geographic Background of Thahton Township**

Thahton Township lies between north latitudes 16° 45' and 17° 00' and between east longitudes 97° 15' and 97° 30' and it has an area of 1,393.17 sq km (537.18 square miles).



Location of Thahton Township in Mon State Department of Geography, Mawlamyine University

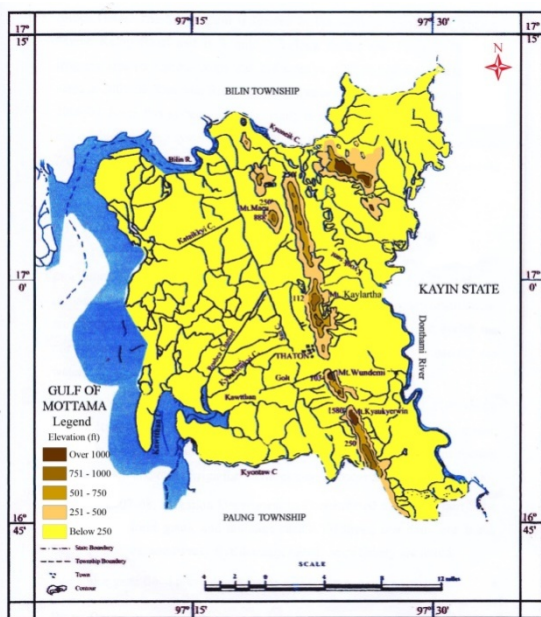


Source: Land Records Department, Thahton Township

Figure 2 Wards and Village Tracts of Thahton Township

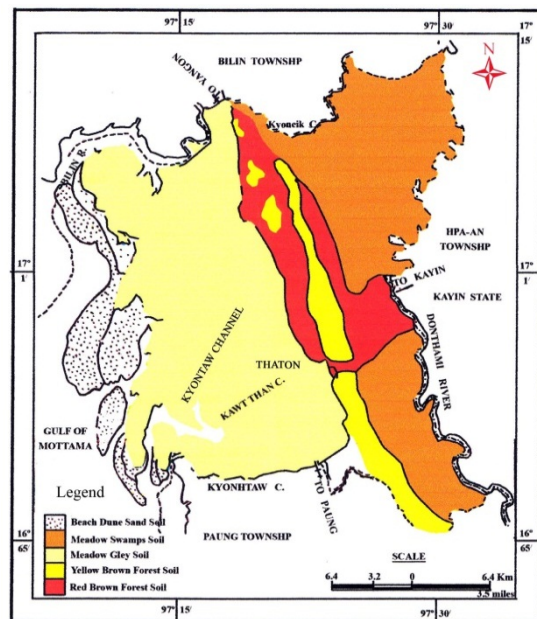
Western Mottama coastal plain slopes gradually down towards the Dontaingyi River. This area is about 30.5 meter (100 feet) above sea level and extends about 19.3 kilometer (about 12 miles) from east to west. This area is most important region for economic activities including agriculture. In the eastern part, the lowland area is about 15.2 meter (50 feet) above sea level.

These hills and mountain ranges occupy about 30 percent of the whole Township, that lies in the central part of the township. Although most of the areas are suitable for Sacha Inchi cultivation, major areas are found in the central part of the township.



Source: DEM

Figure 3 Topography and Drainage of Thahton Township



Source: Land Use Department, Yangon Township

Figure 4 Soils in Thahton Township

The temperature is high throughout the year but the weather is not extremely hot, due to abundant rainfall. The highest temperature is 37.25°C in April and the lowest temperature is 21.64°C. It receives heavy rainfall from the southwest monsoon and storms occurring in the Bay of Bengal. The total annual rainfall of Thahton Township was 5,556.05 mm (218.74 inches). According to Koppen's classification, Thahton Township experiences Tropical Monsoon (Am) climate.

In the study area, five main groups of soils: red brown forest soils (2) yellow brown forest soils (3) meadow gley soils (4) meadow swamps soils and (5) beach sand dune soils are found. Except, beach sand dune soil, remaining soil types are suitable for Sacha Inchi cultivation.

### **Requirements for Sacha Inchi cultivation**

Sacha Inchi is mainly grown at an elevation between 900 and 1700 m. The areas having Temperature Range between 10°C and 36°C are suitable for it and where temperatures are higher than 36 °C, flowers are dropped off and immature fruits are produced, while temperatures below the optimum cause slow growth and flowering.

Sacha Inchi prefers full sun; though it grows with other plants in forests, low light reduces flowering and subsequent fruiting. The areas having rainfall between 850 and 1000 mm and it is best if rainfall is evenly distributed over 12 months. Irrigation is important during dry months, though overwatering increases disease problems.

It prefers medium-textured soils (sandy or clay loams) over heavy clays and very sandy soils. Soil pH should be between 5.5 and 7.8; it is a good option for acidic soils with high aluminium levels. It is important to select a site that is well drained. Level ground is needed to keep water around the plants.

Vines typically climb to a height of 2 m and need to be supported. The plants respond well to fertilizer and can also be intercropped with low growing crops such as peanuts, beans and cotton.

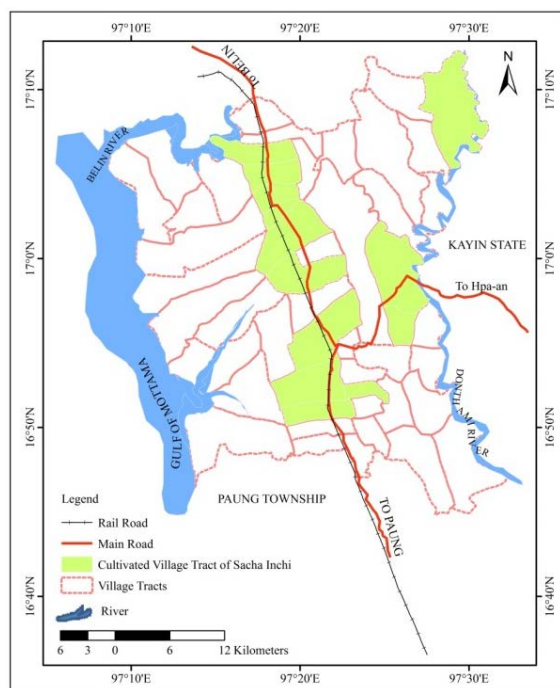
### **Characteristics of Sacha Inchi**

The fruit of this plant is small and star-shaped, containing 4-7 pods. It is a delicious and gives an incredibly healthy snack because of high concentration of nutrients. Sacha Inchi seeds have been widely called the newest "superfood" including concentration of antioxidants and active organic compounds.

### **Sacha Inchi Cultivation and Production**

The Sacha Inchi plant can reach up to 2 metres in height and it flowers approximately 5 months after being planted, and will bear fruit after a further 3 months (<https://www.SachaInchifacts.com>). But, according to interviews with Sacha Inchi cultivators, fruits can be plucked 8 months after being planted. Six hundred Sacha Inchi plants can be grown in an acre.

In Thahton Township, Sacha Inchi plants are mainly grown in 10 village tracts: Naung Bo, Kyaik Kaw, Thein Seik, Ta Dar U, Moe Kaung, Htaung Hmu, Du Yin Seik, Taung Kyar, Pein Hne Taw and Taung Zun. Total cultivated area was more than 50 acres in these village tracts in 2019. Although the cultivated area was large in the starting period, area occupied by it decreased due to low price caused by price fluctuation.



Ward No.	Village Name	Ward No.	Village Name
1	Paw Taw Mu	8	Htaung Hmu
2	Naung Ku Lar	9	Taung Sun
3	Kyaik Kaw	10	Thein Seik
4	Pein Hne Taw	11	Ta Dar U
5	Du Yin Seik	12	Moe Kaung
6	Kyon Par	13	Naung Bo
7	Taung Kyar	14	Tha Yet Taw

Source: Interview and field observations

Figure 5 Sacha Inchi Cultivated area in Thahton Township

At the first time plucking, a Sacha Inchi plant can produce fruits that give 0.5 kilo of seeds, but amount gradually increased and it produces 1 kilo in second time. Then, it can give more than 2 kilo of seeds. Cultivators can pluck the seed twice per year.

On the other hand, cultivators sell Sacha Inchi leaves and can pluck 15 or 20 kilo per year from a plant. Sacha Inchi leaves can be plucked three times per month. Some cultivators dry up the leaves before they sell because of price difference. The price of green Sacha Inchi leaves is 1000 kyat per kilo and that of dried leaves is 5000 kyats per kilo. Sacha Inchi husks are also sold for the purpose of using tea leaves instead to drink like green tea. The price is 1000 kyats per pack. Fried fruit production is between 12 and 15 baskets per acre.

Sacha Inchi cultivation is labour intensive work in watering, plucking fruits and leaves. Therefore, labour requirement is high. Labour cost is high and labour cost for male is 5000 kyats per day and that of female is 3000 kyats per day. To pluck fruits and leaves, 3 persons are needed in plucking fruits and leaves. Moreover, after the fruits have been dried, labour is also used in crushing nut of Sacha Inchi fruits. As the plants are watered once per two days, labour is also needed in watering.

Sacha Inchi fruits are mainly plucked in the dry period to avoid the decaying caused by moisture in the fruits. In the dry period, not only moisture content is low in Sacha Inchi fruits but also it has long period of solar radiation and high intensity.



**Plate 1** Sacha Inchi plants



**Plate 2** Sacha Inchi fruits



**Plate 3** Sacha Inchi seeds

**Market and price**

Sacha Inchi seeds are bought by traders from Myawaddy, Mandalay and Yangon. Traders from Myawaddy come to Thahton for the purpose of buying the seeds. But, growers have to send the seeds to Yangon and Mandalay. At the time, growers cost more because of transportation cost and labour cost in sending the seeds.

Price fluctuation is one of the determinant factors in Sacha Inchi cultivation. Last two years, its price is high with 2500 ks per kilo and it distinctly increased to 7500 kyats per kilo in 2017-18. But, it again decreased to 3000 kyats per kilo in 2018-19. It was due to cheating of traders or growers. As the price and demand were high in 2017-18, growers or traders mixed quality seeds and low quality seeds, and these seeds are, then, sold out. Therefore, quality of seeds is much lower than those produced from Vietnam and Peru. As a consequence, price of Sacha Inchi decrease in 2018-19.

Another reason is local factories producing Sacha Inchi products cannot afford to buy all seeds produced in Myanmar and Sacha Inchi production depends on external market. In Sacha Inchi products production, many raw materials are needed to produce daily used items. Sacha Inchi product factories in Myanmar do not have much innovation to produce Sacha Inchi products.

**Table 1 Change in Sacha Inchi Price**

	<b>Price ( Kyats per kilo)</b>
2016-17	2500
2017-18	7500
2018-19	3000

**Source:** Interviews with growers

**Sacha Inchi products**

As the Sacha Inchi fruits contain many nutrients that support human health and beauty. In Myanmar, Sacha Inchi factories such as Kaungsatwady, Pyinoolwin Kyalpe Family, etc produce daily use items such as body soaps, lotion, shampoo, dried leaves, oil, cream, lipstick, liquid foundation, balm, etc. Products produced from Kaungsatwady Company are as follows:



**Plate 4** Sacha Inchi Facial Foam and Milk lotion



**Plate 5** Sacha Inchi lipstick



**Plate 6** Sacha Inchi night cream



**Plate 7** Sacha Inchi Dry leaves



**Plate 8** Sacha Inchi Spices



**Plate 9** Sacha Inchi liquid foundation

Products produced from Pyinoolwin Company are as follows:



**Plate 10** Sacha Inchi soap



**Plate 11** Sacha Inchi shampoo



**Plate 12** Sacha Inchi body lotion

Thailand also produce more qualified Sacha Inchi products. These are as follows:



**Plate 13** Sacha Inchi oil soft gel capsules



**Plate 14** Sacha Inchi Powder



**Plate 15** Sacha Inchi Roasted seeds

Although they produce many items, they cannot buy all seeds produced from Myanmar due to raw material and innovation requirement as well as market demand. As the production is in starting period, demand is low.

### Major Factor affecting Sacha Inchi Cultivation

Water availability is one of the major factors affecting Sacha Inchi Cultivation. It needs much amount of water and grower cost on water availability and labour cost for watering. Although regular water availability is important, the plants cannot be grown in poor drainage area.

Labour cost is also a factor for Sacha Inchi Cultivation. Not only for cultivation and watering but also for plucking leaves and seeds, labour are needed. Therefore, labour cost is high in cultivation due to labour shortage.

Market demand and price are also important and local growers hope to get high market demand and stable price. As local factories cannot use the seeds produced in Myanmar, growers depend on external market. Buyers bought only quality seeds. When the local market demand is low and price fluctuation high, local growers get low economic return.

Final and the most important factor needed for Sacha Inchi Cultivation is attitude of local grower and traders. It is important to cultivate good varieties and to maintain quality of seeds that have high market demand. Good quality seeds can be not only sold to local factories produced Sacha Inchi products and export to Thailand.

According to phone interviews with authorities from Kaungatwady and Pyin On Lwin Companies (Maemaechit), they owned Sacha Inchi farms and they use their seeds in producing Sacha Inchi products. Raw materials and technologies are available from Thailand and produced from their owned farms. But, they also buy seed produced from Shan State and the townships located in Central Myanmar nearness to Mandalay for the purpose of reducing transportation cost. They buy only quality seeds to produce quality products. They also said Sacha Inchi seed production is high in Myanmar and it is needed to extend the market in nearby countries. But, Myanmar's neighbouring countries such as Thailand cultivate Sacha Inchi plants extensively. Therefore, it is necessary to compete these seeds in quality and price. In production, these companies produce more than 30 items and they need new technologies and raw materials from Thailand.

### SWOT Analysis of Sacha Inchi Cultivation

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- Favourable relief and climate</li> <li>- Vast suitable area</li> <li>- Long-term productivity</li> </ul>	<p><b>Weakness</b></p> <ul style="list-style-type: none"> <li>- Low quality seed</li> <li>- Low investment</li> <li>- Low market price</li> <li>- Low market demand</li> <li>- Innovation requirement</li> <li>- High labour costs</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- Creation of new job</li> <li>- Support human health and beauty</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>- Price fluctuation</li> <li>- Small market for production</li> </ul>



### **Strengths**

- Favourable relief and climate

In the study area, most of the area is free from water logged conditions although most of the level land.

- Vast suitable area

Large level land is suitable for Sacha Inchi Cultivation.

- Long-term productivity

Sacha Inchi plants are perennial plants and it gives seeds for many years. Therefore, cultivators get long term income from Sacha Inchi Cultivation.

### **Weakness**

- Low quality seed

Sacha Inchi plants produce small amount seeds because of low yield variety and unsystematic cultivation systems caused by low investment.

- Low investment

Cultivators have low amount of investment but Sacha Inchi Cultivation costs much.

- Low market price

As quality of local Sacha Inchi variety is low and market demand is low, cultivators get low market price and less economic return. Neighbouring countries buy Sacha Inchi seeds at low price.

- Low market demand

In Myanmar, Sacha Inchi products production is low. Therefore, local market demand is low.

- innovation requirement

Sacha Inchi cultivation needs new innovation in irrigation, storing, cultivation, etc. lack of innovation availability is one of the weaknesses in Sacha Inchi cultivation.

- High labour costs

High amount of labour is used in cultivation, plucking leaves and seeds, drying, crushing and packing. labour shortage and high labour cost affect Sacha Inchi cultivation.

### **Opportunities**

- Creation of new job

As it is labour intensive works, job opportunities is found in off farm period and summer holidays for young adults and old aged persons.

- Support human health and beauty

It contains much amount of nutrients that support human health.

### **Threats**

- Price fluctuation

Local cultivators encounter great income loss caused by price fluctuation that is directly related to demand of neighbouring countries especially Thailand.

- Small market for production

Local market for Sacha Inchi products is small as the products cannot compete the Sacha Inchi products from other countries.

### Conclusion

Generally, Sacha Inchi is perennial plant and it is easy to be cultivated although they have many requirements for successful cultivation. But, it is not successful until now due to high labour cost, price fluctuation and low market demand, etc.

Sacha Inchi has impressive health benefits and it is used as snacks and daily used items. Most of the areas in Thahton as well as Myanmar are suitable for Sacha Inchi cultivation. To upgrade cultivation, it is needed to educate the local growers to choose the quality seeds in cultivation and to maintain quality of the seeds to get high demand and high price. Moreover, it is necessary to encourage local entrepreneur to help Sacha Inchi products production not to depend external market. It is also needed to plan for quality products production in Myanmar's style. Local market demand should be heighten by broadcasting the health benefits of Sacha Inchi products through social media.

It is necessary to compete the seeds produced from Thailand and the price will be high when the Sacha Inchi seeds production in Thailand is low. But, it is difficult because it can thrive easily and Sacha Inchi seeds are produced two times per year. Therefore, it is important to use Sacha Inchi seeds in local factories and to increase local market demand.

In the future, the research works on soils, market, should be made by Sacha Inchi, Systematic cultivation and market channels to upgrade Sacha Inchi in Myanmar.

### Acknowledgement

We would like to express heartfelt thanks to Dr. Mya Mya Aye, Rector, Hpa-an University and Dr. Than Than Myint, Pro-Rector, Hpa-an University for their permission to submit the paper. Thanks are also extended to Dr. Myat Soe Khaing, Professor and Head, Department of Geography, Hpa-an university for her encouragement to present the paper. Special thanks to Professor Dr. Myint Thida, Department of Geography, Hpa-an University for her valuable advice and encouragement to present the paper.

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