

## **POTENTIAL AND RETURN OF AROMATIC COCONUT PLANTING COMPARE WITH OIL PALM PLANTING IN SURAT THANI, THAILAND**

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### **ABSTRACT**

This study analyzed potential and return of aromatic coconut planting by comparing with oil palm. Orchardists and farmers were selected by the purposive random sampling method. In-depth interview was performed during July 2016- March 2017. Findings revealed that aromatic coconut had an economic potential for planting in Tarpi River floodplain area. Return analysis was carried out by assuming that the harvesting period of both crops was 30 years with a 10% discount rate, and the land area for planting was 10 rai/family. The result showed that aromatic coconut had NPV 1,619,999 THB, IRR 28.9%, and the payback period was 3 years and 8 months from the first harvested year. The return of aromatic coconut planting was higher than that of the oil palm which had NPV and IRR of 997,034 THB and 20.7%, respectively. The payback period of oil palm planting was 4 years and 11 months. Therefore, finding suggested that aromatic coconut had economic potential in terms of costs and return.

**Keywords:** 1) Economic Potential 2) Cost and Return 3) Aromatic Coconut 4) Oil Palm 5) Thailand

### **1. Introduction**

Thailand is the third world's largest palm oil producer behind Indonesia and Malaysia. In 2015, the total planting area of crops was about 4,276,240 rai nationwide. Over the past years, crop planting areas in the country has increased continuously as a result of the Oil Palm Industrial Strategy campaign that has paved the way for Thailand to increase its oil palm plantation areas, it is expected that by 2029, Thailand will have increased its plantation areas to 10,000,000 rai (Office of Agricultural Economic, 2015), as well as a consequence of government support for oil palm production to produce alternative energy supplies. the Southern region and Surat Thani where Oil palm plantation mainly takes place is the largest oil palm producers (26.59% of total oil palm production) among all the other provinces of the country (Petchseechong, 2017), Most oil palm farmers are private and smallholders which causes plantations to be carried out in small areas around 10-20 rai in contrast to Indonesia and Malaysia (Phitthayaphinant *et al.*, 2013), moreover many farmers are lack of knowledge on the subjects of efficient farm management, quality seed selection, fresh palm preservation and harvesting process as well as reasonable selling price. Package problems are also one of the issues in oil palm planting in Thailand. Yield, however when

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considered among other problems, is thought to be the most important one. The yield of oil palm in Thailand is between 14-17% oil whereas Indonesia and Malaysia can achieve a rate of over 20%. Relatively low yield leads middlemen or buyers of oil palm fresh fruit bunch (FFB) to set prices for the farmers regardless of yield. Therefore, the farmers have no incentive to develop higher yield. As a result, they tend to do early harvesting before the fruits matures the highest possible rate of oil extraction yields (Phitthayaphinant *et al.*, 2013). Planting oil palm also consumes high cost of investment, fertilizer compose, large land area, and labor force. The total costs of production for oil palm planting shows that oil palm planting is reasonably higher in comparison with other corps such as rubber and rice. Price variation is another considerable problem that farmers always cite, especially during the high season in September when the price of FFB is lowest. Another factor resulting in price variation is the non-restricting crude palm oil import policy of the government (Petchseechong, 2017). Therefore, oil palm farmers, like other agriculturalists in Thailand are faced with insufficient family income. In order to relieve this problem, they should change over their planting methods from mono crop plantings to multi or mixed crop plantings. In Surat Thani, aromatic coconuts among other tropical fruits become an alternative crop for farmers, especially in the Tarpi River floodplain area.

Since there are still limited number of research focusing on initial investment costs, revenue, and return of aromatic coconut solely, this study focuses on the comparison of economic potential costs and return of aromatic coconut planting with oil palm planting. Most of the studies conducted on the subject of aromatic coconut planting in Thailand merely focus on the agriculture perspective such as planting practices, farm management, and breeding. Therefore, a further study on costs and return of aromatic coconut planting may be helpful to provide a better insight into its financial aspects. To fill this knowledge gap, this study seeks to characterize investment, revenue, and cost profiles of aromatic coconut planting. Findings from the study will shade more light on cost and return of aromatic coconut planting for local farmers in Surat Thani and in other regions of Thailand.

## **2. Research Methodology**

In order to determine the economic potential, costs and return for aromatic coconut planting classified as a minor economic crop of the country behind oil palm, rubber, sugarcane, cassava and rice, quantitative method was performed by using of semi-structured questionnaire for in-depth interview. The advantages of the questionnaire technique are that it allows information to be collected from a large number of people and the findings can be expressed in numerical terms while semi-structured interviews can allow issues to be explored in greater depth (Veal, 1997). In addition, it is possible that through the face-to-face in-depth interview method, local orchardists feel more confident and relaxed to share their personal information, revenue, expense, household debt, and cost and return of planting as well as agricultural practices.

### **2.1 Samples and Data Collection**

The sample surveyed included 30 aromatic coconut orchardists and 25 oil palm farmers who were selected by the purposive random sampling method (Table 1). The criteria used for selection were location, size of orchard or plantation, and age of crops. Aromatic coconut orchardists mainly focused on plantations locating in the Tarpi River flood plain area of Muang district, Surat Thani province, Thailand. Soil types of this area has been classified as appropriate for many plants in the palm family, e.g. coconut, oil palm (Office of Soil Survey and Land Use Planning, 2007). Oil palm planting data collected from the farmers of three districts: Muang, Punpin, and Kanchanadit which were all classified as

having the same groups of soil types. Therefore, orchardists could decide whether they should plant aromatic coconut trees, oil palm trees, or both.

Semi-structured questionnaire was used for in-depth interview. Before finalization of the questionnaires, a pre-test was performed with 10 orchardists (5 orchardists each). The interview process took place around nine months (July 2016 – March 2017) due to the reason that there was no up-to-date name list of aromatic coconut orchardists gathered by the government agencies. Data gathering was mainly supported by the local offices, and sub-district and/or village leaders. All of the interviewees were orchard owners who are well informed on initial investment, revenue, expense as well as knowledge of agricultural practices performed for their orchards. We therefore believe that all the answers are reliable.

**Table 1:** Sample Characteristics

	<b>Aromatic Coconut (N=30)</b>	<b>Oil Palm (N=25)</b>
Average Planting Area	4.8 rai/family	29.6 rai/family
Location		
Muang district	25	7
Other districts	5	18
Size of Orchard/Plantation		
Less than 10 rai (mall)	28	2
11-50 rai (medium)	2	20
More than 50 rai (large)	-	3
Age of Crops	Average age, 9.5 years	Average age, 13.8 years
Less than 3 yrs (no yield)	9	5
More than 3 yrs (crop yield)	21	20

**Note:** 1 rai = 0.16 ha

## 2.2 Survey Instrument

The extent of use of cost and return data in this study was measured using a developed semi-structured questionnaire based on the previous research (Krisanapook, 2014, and Cheongthong and Cheongthong, 2016). This research comprises of five sections. In section I which contains orchardists and planting profiles, Interviewees were asked about their personal data, in Sections II and II, interviewees were asked to indicate knowledge in agricultural practices and farm management by multiple choice questions. Revenue, expenses and planting costs were asked in the last two sections because these are the core elements on which this study focused, the farmers were interviewed by the researchers about the details relating to harvesting, marketing channel, initial investment costs, and costs of farm management in each period of planting (Year 0- early stage of planting; Year 1-3, stage that plants have no yield, and Year 4 onwards, plants begin to yield).

## 2.3 Return Analysis Indicators

Return analysis was used for the evaluation of investment return for long-run decision planning. The analysis is based on the discounted cash flow methods which measure expected future cash inflows and outflow of a project discounted back to the present point in time (Mowen, et al., 2014, Horngren, et al., 2015). In this study, three indicators were used to evaluate the return of planting: net present value (NPV), internal rate of return (IRR), and payback period (PB). The NPV was used to analyze return of project investment comparing with an expected rate of return. The IRR was used to estimate planting's profitability through

comparison with cost of capital and return. Both NPV and IRR analyses undertaken under the concept of time value of money. However, the PB determines the number of years that takes to recover the initial investment by ignoring the time value of money. In addition, three situations were assumed (most likely, optimistic, and pessimistic) to reflect the impact of economic fluctuation. Most likely situation refers to normal economic environment. Optimistic presents the best economic and planting factors, highest yield and price. Considering the fact that prices of agriculture products normally are effected by internal and external uncontrollable factors. Examples of factors effecting producing aromatic coconut and oil palm were insects, water flooding, crude oil palm import policy, and climate change. The last situation, which is pessimistic assumes that orchardists and farmers face with lowest yield and price.

### **3. Results**

#### **3.1 Demographic Information**

This study interviewed 30 aromatic coconut orchardists. The total plantation was 40 plants, or 73 rai, 9.1% of the province aromatic coconut planting area. For oil palm, 25 farmers were interviewed, and found that they had 57 plantations in total. An average age interviewees for both corps was 60 and 54.4 years, respectively. Education level diversifies from under graduated, bachelor degree, and higher education. Thus, most of them have long-time experiences in planting and agricultural practices have been well-performed. Specifically, oil palm growers classify their planting pattern as a mono crop planting. Instead, aromatic coconut orchardists perform a multi crop planting. Other crops that are planted together with aromatic coconut in their plantations are betel palm, lime, pandanus, and banana. Both corps begin to produce 3 or 4 years after they have been planted. Aromatic coconut and oil palm are harvested every 20 days, and twice a month, respectively. Thus, half of the aromatic coconut orchardists also plant other crops, such as rubber, oil palm, and tropical fruit.

#### **3.2 Marketing Channels and Revenue**

Aromatic coconuts are mostly supplied for local market consumption, either for Thai and foreign tourists. About 80% of plantations have unofficial sell contracts with wholesalers from the Pho Wai vegetable and fruit distribution center of Surat Thani. Wholesalers buy coconuts in cash, then harvest young coconuts every 20 days. Wholesale price in high and low seasons are 5-12 THB/unit. Retail price in main land and islands are considerable difference. In main land, the price of aromatic coconut was 15-20 THB/unit. The price of aromatic coconut is usually twice or three times higher when it is sold at tourist destinations, especially in Samui and Pha-nagn islands. Harvest and transportation costs are paid by wholesalers. Total revenue of aromatic coconut planting in high and low season is 3,000-3,600 THB/rai/harvest time, or 54,000-64,800 THB/rai/year, depending on number and size of coconuts in each bunch.

In contrast, oil palm planting have different market channels. Oil palm fresh fruit bunch (FFB) are harvested twice a month and sold at either nearby ramps (72%), refine mills (20%) or both (8%). Currently, FFB price is set by the Department of Internal Trade which specifies a general reference price. Together, buyers consider physical appearances of bunches of oil palm such as loosen fruits, ripeness, and size of fruits (Termmahawong, 2013). The higher the weight per bunch is, the higher the price is. Normally, the price is quoted without consideration of the grade of FFB, and it is assumed that the oil extraction yields are 17% (Petchseechong, 2017). This study found that FFB price varied from 3-7 THB/kg during high and low seasons, respectively. Harvest and transportation costs paid by the farmers, varied from 50-100THB/ton FFB. Oil palm planting is a labor consumed

work. Half of the farmers rely on 100% labor from their family members whereas another half hire seasonal or permanent labors. In the absent of harvest and transportation costs, total revenue of oil palm planting in high and low season is 1,825-2,625 THB/rai/harvest time, or 44,280-63,000THB/rai/year. Findings suggested that marketing channels and harvesting costs burden of aromatic coconut orchardists and oil palm farmers are different. In addition, whereas aromatic coconut planting is mostly based on family labor for farm management and harvesting, oil palm planting seems carried out by labor hire regardless of the extent to which the plantation area is small

### 3.3 Return Analysis

Return analysis was performed by assuming that the harvesting period of aromatic coconut and oil palm was 30 years. The expected rate of return was 10%, and the land area for planting was 10 rai/family.

#### 3.3.1 Aromatic Coconut

Initial investment costs in agricultural comprises of seeds or breeding costs, costs of land rental, agricultural machines and supplies, land development and preparation, primer fertilizer and other planting expenses. In Year 0 the initial investment for aromatic coconut planting is 288,500 THB. Plants have no yield (Year 1-3), variable and fixed cost for plantation management are 7,754 THB/rai, and 62,214 THB/year, respectively. When plant begins to yield (Year 4 onwards), variable and fixed costs increase from the prior period to 9,404 THB/rai, and 63,864 THB/year, respectively. In year 0-3, total investment for 10 rai plantation of aromatic coconut is 870,921 THB (Table 2).

Return analysis was performed and found that in most likely and optimistic situations aromatic coconut planting contributed positive NPV (1,619,999 and 2,090,448 THB, and IRR 28.9% and 32.0%, respectively). The PB varies between 3-3.5 years from the first harvested year. Instead, pessimistic situation showed negative NPV and IRR indicators. Result suggested that orchardists should carry on with their planting investments for that the project had positive NPV throughout the harvesting period and the IRR was greater than the 10% expected return.

**Table 2:** Return Analysis for Aromatic Coconut Planting

Years	Net Cash Flow			Years	Net Cash Flow		
	Most likely	Optimistic	Pessimistic		Most likely	Optimistic	Pessimistic
0-3	-870,921	-870,921	-870,921	19	323,574	509,909	60,614
4	278,710	287,155	52,210	20	176,809	365,008	-88,780
5	131,497	290,027	-97,268	21	330,077	520,158	61,833
6	284,312	292,297	53,259	22	333,378	525,360	62,451
7	287,155	145,856	53,792	23	336,712	530,614	63,075
8	290,027	298,815	54,330	24	340,079	535,920	63,706
9	292,927	301,803	54,873	25	193,480	391,279	-85,657
10	145,856	304,821	-94,578	26	346,915	546,692	64,987
11	298,815	307,869	55,976	27	350,384	552,159	65,636
12	301,803	160,948	56,536	28	353,888	557,680	66,293
13	304,821	314,057	57,101	29	357,427	563,257	66,956
14	307,869	317,198	57,672	30	361,001	568,890	67,265
15	160,948	320,370	-91,751	NPV	1,619,999	2,090,448	-645,536
16	314,057	323,574	58,832	IRR	28.9%	32.0%	-0.1%
17	317,198	176,809	59,420	PB	3 yrs 6 m	3 yrs 1 m	n/a
18	320,370	504,861	60,014				

### 3.3.2 Oil Palm

Oil palm planting requires the same amount of initial investment as aromatic coconut planting, (288,500 THB). The total costs of Year 1-3 and Year 4 onwards are almost the same. Total variable cost for oil palm planting of such periods is 10,264 and 10,339 THB/rai, respectively. Total fixed cost spent is 54,460 THB/year throughout the planting period. This is because oil palms requires relatively high fertilizers and labor work, especially for harvesting process.

Return analysis revealed positive NPV and IRR for all three sensitivity situations (Table 3). Due to oil palm is has economic value, its price is set by market. However, whereas in most situations, the NPV and IRR of oil palm plant remains lower than that of aromatic coconut (997,036 THB, and 20.7%). In pessimistic situation, due to the NPV and IRR still shows positive value, planting oil palm seems to offer more secure return in the long term. This finding suggested that in most situations and optimistic economic environments planting aromatic coconut or oil palm could both contribute reasonable income for farmers. However, aromatic coconut should be planted by caution due to its small market and unstable price.

**Table 3:** Return Analysis for Oil Palm Planting

Years	Net Cash Flow			Years	Net Cash Flow		
	Most likely	Optimistic	Pessimistic		Most likely	Optimistic	Pessimistic
0-3	-976,764	-976,764	-976,764	19	263,552	373,611	211,076
4	227,010	233,889	181,810	20	116,187	227,348	63,187
5	79,280	236,228	33,628	21	268,849	381,121	215,318
6	231,573	238,590	185,464	22	271,537	384,932	217,472
7	233,889	90,976	187,319	23	274,253	388,782	219,646
8	236,228	243,385	189,192	24	276,995	392,669	221,843
9	238,590	245,819	191,084	25	129,765	246,596	74,061
10	90,976	248,277	42,995	26	282,563	400,562	226,302
11	243,385	250,760	194,925	27	285,389	404,568	228,565
12	245,819	103,268	196,874	28	288,242	408,613	230,850
13	248,277	255,801	198,843	29	291,125	412,699	233,159
14	250,760	258,359	200,831	30	294,036	416,826	235,491
15	103,268	260,942	52,840	NPV	997,036	1,307,224	544,927
16	255,801	263,552	204,868	IRR	20.7%	23.0%	16.0%
17	258,359	116,187	206,917	PB	4 yrs 11 m	4 yrs 9 m	8 yrs 3 m
18	260,942	369,912	208,986				

## 4. Conclusions

Aromatic coconut is an alternative economic crop planted in Muang district, Surat Thani, Thailand. Income received from planting economic crops such as oil palm and rubber has been unstable for decades. The Total aromatic coconut planting area in the province is about 1,304.53 rai and all aromatic coconuts are used mostly for local consumption. In the province, aromatic coconut planting is done through the mixed crop planting method whereas oil palm planting is done through the mono crop method.

Several studies confirmed that about 68% of oil palm producers own lands around 10-20 rai for plantation. Moreover, many farmers are lack of knowledge on the subjects of efficient farm management. Therefore, this study determines whether oil palm farmers should set apart their plantation lands for aromatic coconut plantation in order to diversify their income stream. Return analysis with three indicators: NPV, IRR, and PB were performed and found that in most likely and optimistic economic situations, aromatic coconut gave higher NPV ( 1,619,999 and 2,090,448 THB ) and IRR (28.9% and 32.0%, respectively) than that of oil palm. The NPV and IRR of oil palm planting in most likely and optimistic economic situations were 997,036 and 1,307,224 THB, and 20.7% and 23%, respectively. However, in pessimistic situation, it would seem that oil palm planters have the tendency to take lesser risk than aromatic coconut orchardists for it still shows positive NPV and IRR of 544,924 THB, and 16.0%, respectively. Therefore, findings suggested that aromatic coconut plantings had economic potential in terms of costs and return for small area planting in Surat Thani floodplain area. The findings also benefit to government agencies in terms of policy setting to promote and support for aromatic coconut growers in Surat Thani and other provinces.

## 5. Acknowledgement

This research was financially supported by the Thailand Research Fund, Grant no. RDG5950115.

## 6. References

- Cheongthong, S. and Cheongthong, S. (2014). **A Financial Investment Analysis and Optimum Replanting Age of Oil Palm of Smallholders, Surat Thani Province**. Bangkok: The National Research Council of Thailand.
- Horngren, C., Datar, S. and Rajan, M. (2015). **Cost Accounting: A Managerial Emphasis** (15<sup>th</sup> ed.). England: Pearson Education.
- Krisanapook, K. (2014). **Thai Aromatic Coconut: Alternative Plant New Watch. The Potential Development Project for Young Coconut Exporting**. Bangkok: The Thailand Research Fund.
- Mowen, M., Hansen, R. and Heitger, L. (2104). **Cornerstones of Managerial Accounting** (15<sup>th</sup> ed.). South-Western: Cengage Learning.
- Office of Agricultural Economic. (2015). **Oil Palm**. Retrieved March 30, 2017, from <http://www.oae.go.th/view>
- Office of Soil Survey and Land Use Planning. (2007). **Soil Types**. Retrieved March 30, 2017, from [http://www.ldd.go.th/thaisoils\\_museum/62\\_soilgroup/sgr\\_lowland/sgr\\_21.htm](http://www.ldd.go.th/thaisoils_museum/62_soilgroup/sgr_lowland/sgr_21.htm).
- Petchseechoung, W. (2017). **Thailand Industry Outlook 2017-2019, Krungsri Research**. Retrieved October 17, 2018, from [https://www.krungsri.com/bank/getmedia/ac87c171-db74-442b-ae29-5b69572896ca/IO\\_Oil\\_Palm\\_2017\\_EN.aspx](https://www.krungsri.com/bank/getmedia/ac87c171-db74-442b-ae29-5b69572896ca/IO_Oil_Palm_2017_EN.aspx)
- Phitthayaphinant, P., Somboonsuke, B. and Eksomtramage, T. (2013). Price Variation and Factors Determining Prices of Thai Palm Oil and Oil Palm. **International Journal of Agriculture Technology**, 9(4), 749-767.
- Termmahawong, W. (2013). **Oil Palm Production in Thailand with a Special Focus on Small Scale Producers**. Japan International Research Center for Agricultural Sciences. Retrieved October 18, 2018, from <https://www.jircas.affrc.go.jp/program/proD/english/field-information/thai-oil-palm/>
- Veal, A. (1997). **Research Methods for Leisure and Tourism**. London: Longman.