

Seeking an Alternative Natural All-around Oil: Prospects of Tamanu Oil Production in the Philippines

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Abstract

This policy brief explores the prospects of tamanu oil production in the Philippines as an alternative natural all-around oil for the nutraceutical, cosmeceutical, and pharmaceutical industries. Tamanu oil, derived from the seeds of *Callophylum inophyllum*, locally known as Bitao, possesses numerous biological activities, including antioxidant, anti-inflammatory, antibacterial, and wound-healing properties. Despite the abundant growth of Bitao in the Philippines, tamanu oil production remains underexplored. Establishing a strategic research and development agenda can enable the Philippines to capitalize on tamanu oil's market potential, benefiting local communities and the national economy.

In the 21st century, natural products have been the trend in the nutraceutical, cosmeceutical, and pharmaceutical industries. Anything labelled "natural" would have great market potential. Tamanu oil, a high-value carrier oil extracted from seeds of bitao (*Callophylum inophyllum* L.), meets the criteria for an alternative and all-natural cosmetic and pharmaceutical product. It is commonly used to heal skin ailments. Studies have shown numerous biological activities in tamanu oil, such as antioxidant, anti-inflammatory, antibacterial, and wound healing, among others (Raharivelomanana et al. 2018). Some studies also looked at the potential of tamanu oil as an alternative fuel (Raj & Kandasamy 2012; Karthik et al. 2020; Rao et al. 2019), giving it the impression of an all-around ingredient oil. Indeed, tamanu oil already has an established presence in the international market.

Bitao grows abundantly in the Philippines. With its great potential in the global market, tamanu oil production has a promising outlook in the country. However, the country has not fully explored the potential to produce tamanu oil. This necessitates the establishment of a strategic research and development (R&D) agenda to advance the country's tamanu oil industry.

Bitao as a resource

Bitao (Annex 1) is a tree that grows well in coastal areas and is common in the Philippine archipelago. As a source of wood, bitao is most suitable for construction and furniture-making (DENR Administrative Order [DAO] No. 1993-39, 1993). Its seeds (Annexes 2 & 3) produce tamanu oil, which has become a carrier oil for cosmetics and other products and is obtained after macerating or pressing dried seeds (Annex 4). However, tamanu oil is currently not reported in the Philippine Forestry Statistics as a non-timber forest product

(NTFP). It is not a major export earner as much of the country's NTFP exports come from bamboo, rattan, buri, salago, etc. With the increasing popularity of organic and natural products such as oils derived from plants, the prospect of tapping this chemical NTFP is worth pursuing.

The potential of tamanu oil production and the financial profitability of developing bitao tree plantations to supply seeds for tamanu oil production are discussed in this policy brief.

Tamanu oil trade in the international market

In 2019, the international market for tamanu oil was estimated to be worth US\$86 million and is expected to reach US\$130.2 million by 2026. The international market for tamanu oil includes countries from North America, Europe, Asia-Pacific, South America, the Middle East, and Africa. Generally, the two major classifications for tamanu oil are refined and unrefined, and both are used in the cosmetics and pharmaceutical industries (MarketWatch 2021).

Tamanu oil is commercially produced in Tahiti, Fiji, and Vanuatu islands in the South Pacific. It is sold in the international market for US\$4–40 for a 30 millilitres (mL) bottle traded from wholesale producers to bottlers and retailers (Friday and Ogoshi 2011). The demand for tamanu oil is driven by the growing consumer inclination towards natural and plant-based products (Figure 1 and Annex 5). The growth is expected to be higher in developing regions with an increased awareness for more organic and clean labelled products. North America is seen as one of the significant regions that will increase the use of tamanu oil in the cosmetic sector (Expert Market Research, 2016).

Tamanu oil products are being distributed and sold across the globe selling through e-commerce sites.

Annex 6, sourced from Alibaba, shows the global distribution of tamanu oil suppliers. Most of the brands using tamanu oil indicate that their products are "bottled in the USA," and a few indicate India, Korea, Madagascar, and Vietnam as countries of origin.

Figure 1. Tamanu Body Butter



Image source: Northern Tamanu Oil, n.d.

Tamanu oil trade and Bitao seed utilization in the Philippines

Currently, tamanu oil is sold in different sizes or volumes on two of the Philippines' leading e-commerce sites (Lazada and Shopee), ranging from 3 mL to 237 mL bottles, with advertised prices from PhP 100 to PhP 4,851 depending on the brand. The 30 mL bottle is more common in the market and costs an average of PhP 3/mL to PhP 146/mL. Several sellers offer repacked tamanu oil in 10–15 mL glass droppers or rollers to make it more attractive and affordable to first-time users (Annex 7).

Reports on domestic producers give indications on tamanu oil production in the Philippines and is reinforced by information from online sites where sellers claim that their tamanu oil products were made and sourced in the Philippines.

If the industry's potential is strengthened and further developed, the Philippines can also pursue entering the international market. However, a policy issuance specific for bitao seed and tamanu oil production is currently wanting, probably because bitao's potential as a source of tamanu oil is not yet recognized in the country.

Tamanu oil extracted from Bitao seeds can also be an alternative carrier oil alongside more popular carrier

oils such as argan, jojoba, almond, castor, grapeseed, coconut, and hazelnut (Annex 8).

DAO No. 2017-03 (Revised Implementing Rules and Regulations of Executive Order No. 193 or the Expanded National Greening Program) states that beach forest species, including nipa, bitao, bani, and talisay shall be planted as climate change adaptation and mitigation measures as well as a source of additional livelihood. As such, planting bitao under the National Greening Program or the Community-Based Forest Management Program can provide potential livelihood opportunities for communities. Cooperatives and the private sector may likewise consider developing bitao plantations and embark on tamanu oil production.

Potential for bitao tree plantation development for tamanu oil

The potential of developing bitao tree plantations for tamanu oil production in the Philippines was determined using financial profitability analysis. Yield, cost and income assumptions were derived from personal communications and review of secondary data. For the yield, values reported by Friday and Ogoshi (2011) were used, where 5-year-old bitao trees can produce about 5–100 kilogram of nuts per tree and an oil yield of about 50–70% by weight. The estimated plantation development costs based on DENR Technical Bulletin Nos.1 and 2 (DENR-Forest Management Bureau [FMB] 2016) of approximately PhP 29,779.13 per hectare (ha) was used. Other major costs include expenses for collecting and processing seeds and extracting and processing tamanu oil. For the income assumptions, the published price of tamanu oil in online market platforms ranging from PhP 6,400/litter to PhP 37,081.42/litter were used.

Using the available data, profitability analysis showed a positive net present value per hectare (NPV/ha) for scenarios that used low and high yield and price assumptions (Table 1). The lowest NPV for a 1 ha Bitao plantation is attained at a low price and low yield conditions (PhP 51,140,493), while the highest NPV is at a high price and high yield condition (PhP 494,696,598). The resulting internal rate of return (IRR) values are also higher than the existing discount rate of 10%, ranging from 318% to 624%.

Table 1. Summary of NPV and Internal Rate of Return (IRR) of a 1 ha Bitaoag Plantation (r=10%, 50-year planning period)

Level	NPV (PhP/ha)		IRR	
	Low yield	High yield	Low yield	High yield
Low Price	51,140,493	80,807,369	318%	367%
High Price	322,651,827	494,696,598	553%	624%

Note: Estimates were computed using a discount rate of 10% and a planning period of 50 years. The profitability analysis covers the period from the start of plantation establishment up to the point where processed tamanu oil is ready for sale to primary consumers. The income stream starts at year 5 with the availability of fruits and seeds that can be processed into tamanu oil.

This shows that establishing a bitaoag plantation for tamanu oil production is profitable. Unlike other non-timber forest products, growers do not need to wait for an extended period before profits are realized. In the case of bitaoag, the income flow can start as early as five years after establishment. Moreover, bitaoag plantations can grow in various conditions, allowing plantation establishment in a wide range of accessible areas.

Policy Recommendations/Conclusion: Moving forward for the tamanu oil industry

Tamanu oil from bitaoag, a natural and all-around beauty oil alternative, is gaining popularity in the international market with prospects of further growth in the future. There is considerable potential for more industry players to come in as the current market is limited to producers and sellers of tamanu oil. The Philippines, as an archipelago, is well-suited for its growth and the establishment of commercial-scale plantations for tamanu oil production.

If pursued, the tamanu oil industry can engage and benefit local communities by providing them with additional income streams from an endeavor that requires low capital and relatively simple technology. Moreover, its wide range of growing conditions allows bitaoag to be used to rehabilitate marginal and degraded lands.

The R&D agenda may include:

- Genetic studies to establish that the bitaoag variety growing in the Philippines is a good source of tamanu oil;
- Growth, yield, and silvicultural studies to verify the performance of bitaoag trees in natural stands and pilot tree plantations in various locations in the country;

- Studies that explore the techniques in processing oil from bitaoag seeds and investigations on the physical and chemical properties of tamanu oil need to be conducted; and
- Studies on the application of tamanu oil as a cosmeceutical base and as a biodiesel component, and on discovering new applications.

Further, examining the sociocultural factors that may have hindered the development of the tamanu oil industry in the country is relevant because this can shed light on the obstacles that the industry may need to overcome regarding social acceptability and adoption.

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Annexes

Annex 1. Bitao (Calophyllum inophyllum L.) seeds in Darwin, Australia



Image source: Tatters, 2 June 2009.

Annex 2. Bitao (Calophyllum inophyllum L.) seeds



Image source: Solena432, n.d.

Annex 3. Dried Bitao (Calophyllum inophyllum L.) seeds in DFPPS-CFNR, UP Los Baños



Image source: Batallones, 2020.

Annex 4. Tamanu Facial Serum



Image source: Northern Tamanu Oil, n.d.

Annex 6. Sample tamanu oil product bought from Lazada



Image source: Palma-Torres, 2019.

Annex 5. Tamanu Oil suppliers in Alibaba.com as of March 3, 2020

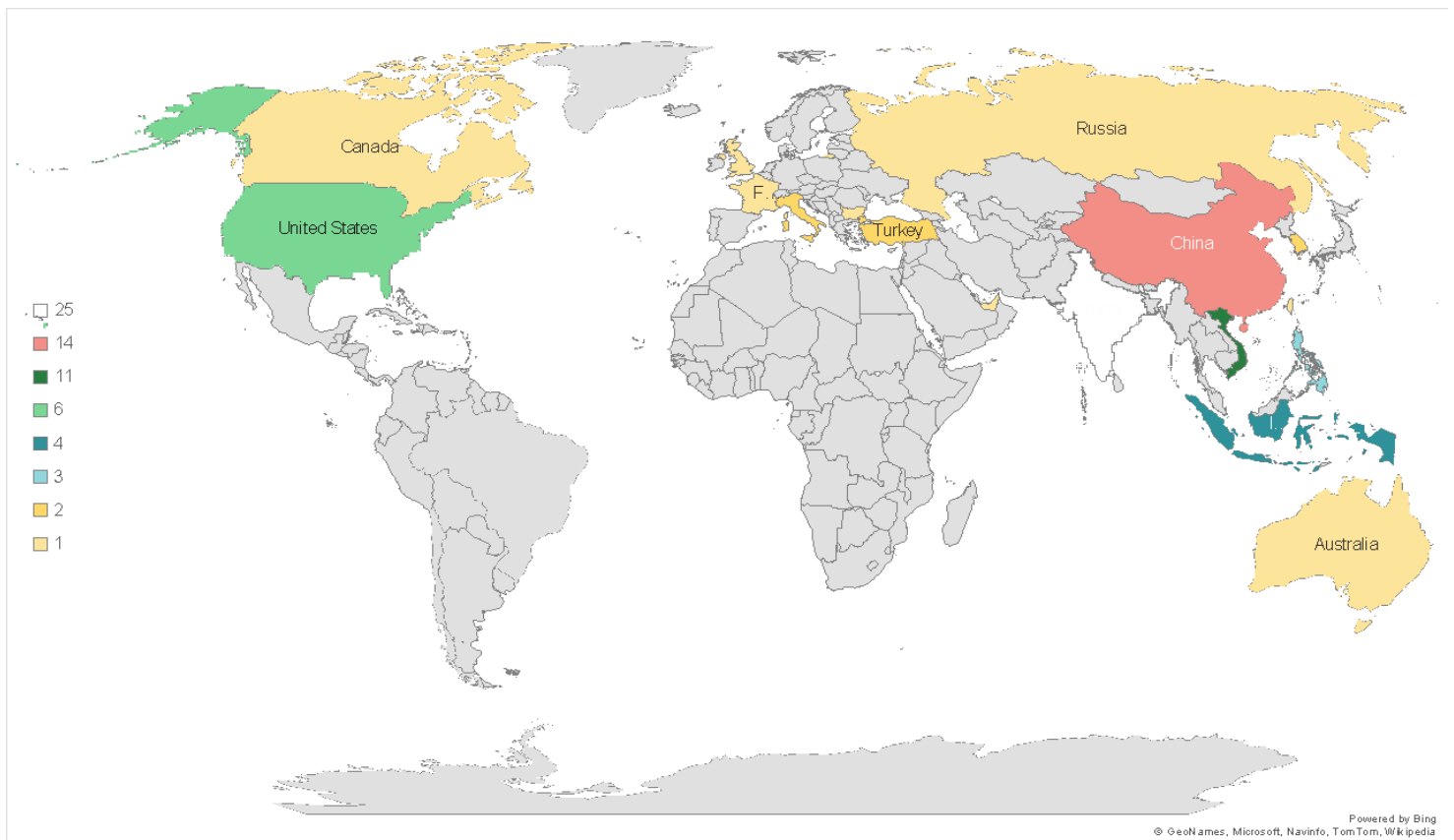


Image source: Alibaba 2020.

Annex 7. Tamanu oil extracted from Bitaoog seeds can be an alternative carrier oil

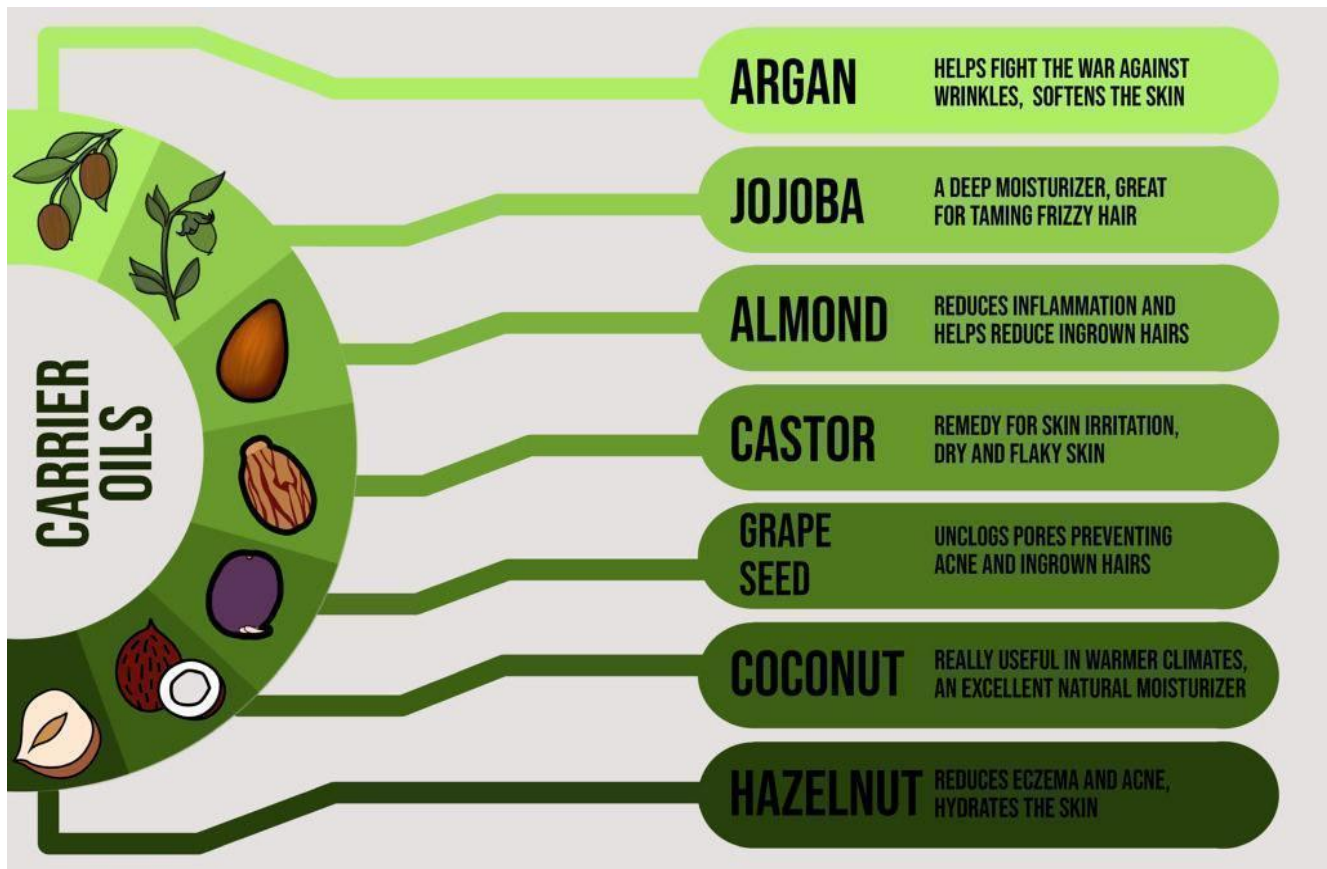


Image source: 2021, Retrieved by: Amada, L.