



POLICY BRIEF

A publication of the Policy Action Group (PAG) of the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD)



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

In the 21st century, natural products have been the trend in the nutraceutical, cosmeceutical, and pharmaceutical industries. Anything labeled “natural” would have great market potential. Tamanu oil, a high-value carrier oil extracted from seeds of ‘bitaog’ (*Calophyllum 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 and Kandasamy 2012, Karthik et al. 2020, and

Rao and Yarrapragada 2019), giving it the impression of an all-around ingredient oil. Indeed, tamanu oil has established its 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.

BITAOG AS A RESOURCE

Bitaog (Fig. 1) is a tree that grows well in coastal areas and is common in the Philippine archipelago. As a source of wood, bitaog is most suitable for construction and furniture-making (DENR Administrative Order [DAO] No. 1993-39, 1993). Its seeds (Fig. 2) produce tamanu oil, which has become a carrier oil for cosmetics and other products and is obtained after macerating or pressing dried seeds (Fig. 3). 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 compared with the country's NTFP exports that 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 bitaog tree plantations to supply seeds for tamanu oil production are discussed in this policy brief.



Fig. 1. Bitaog (*C. inophyllum* L.) tree in Nasugbu, Batangas. (Batallones 2020)



Fig. 2. Bitagog seeds. (Solena432 n.d.)



Fig. 3. Dried bitaog seeds at College of Forestry and Natural Resources (CFNR), University of the Philippines Los Baños (UPLB). (Bataliones 2020)

TAMANU OIL TRADE IN THE INTERNATIONAL MARKET

In 2019, the international market for tamanu oil was estimated to be worth \$86.0 million (M) and is expected to reach \$130.2 M by 2026. The international market for tamanu oil includes countries from North America, Europe, Asia-Pacific, South America, Middle East, and Africa. Generally, the two major classifications of 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 \$4–40 for a 30-milliliter (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. The growth is expected to be higher in developing regions with an increased awareness for more organic and clean labeled 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 by suppliers across the globe through e-commerce sites (Fig. 4). Figure 5 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.

TAMANU OIL TRADE AND BITAOG 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 P100 to P4,851 depending on the brand. The 30 mL bottle is more common in the market and costs an average of P3/mL to P146/mL.



Fig. 4. Product photos of tamanu facial serum and whipped tamanu body butter being sold through Northern Tamanu Oil website. (Northern Tamanu Oil n.d.)

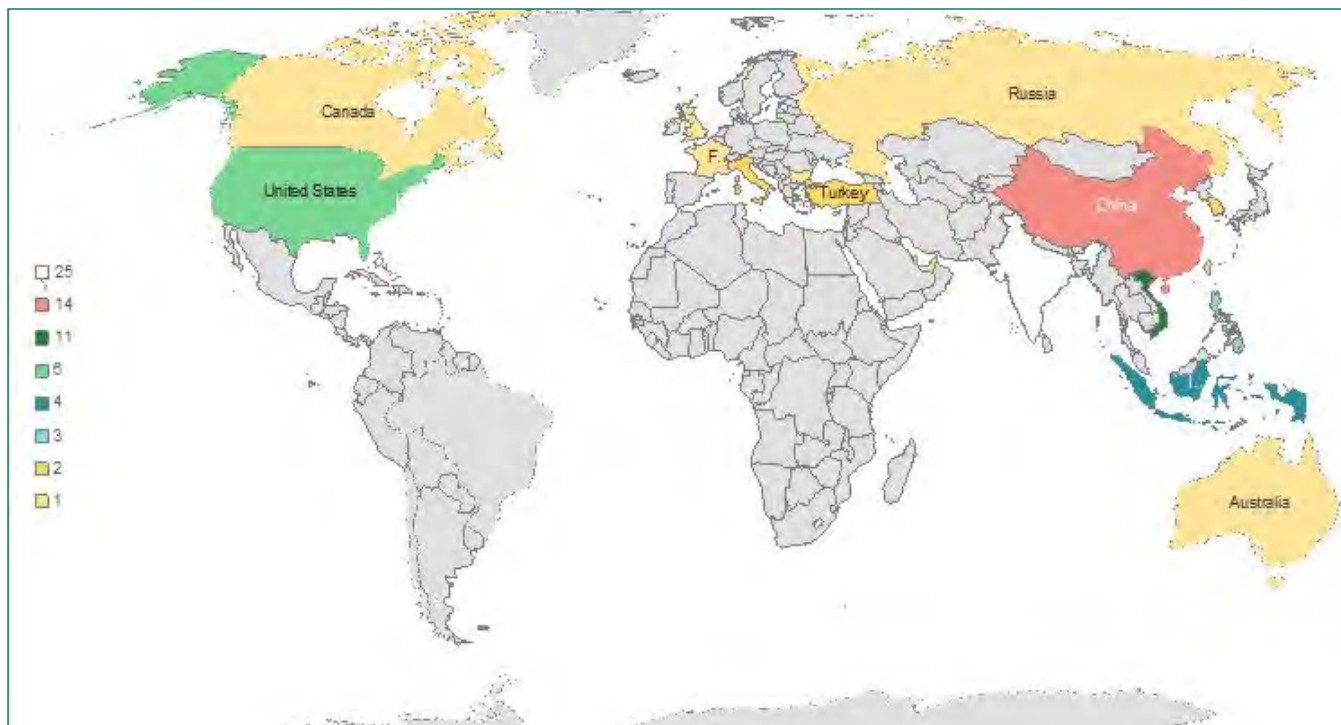


Fig. 5. Tamanu oil suppliers based on Alibaba's website as of March 3, 2020. (Palma-Torres 2020)

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 (Fig. 6).

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 enter the international market. However, a policy issuance specific for bitaog seed and tamanu oil production is currently wanting, probably because bitaog's potential as a source of tamanu oil is not yet recognized in the country. Tamanu oil extracted from bitaog seeds can also be an alternative

carrier oil alongside more popular carrier oils such as argan, jojoba, almond, castor, grapeseed, coconut, and hazelnut (Fig. 7).

The 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,' bitaog, 'bani,' and 'talisay' shall be planted as climate change adaptation and mitigation measures, as well as a source of additional livelihood. As such, planting bitaog 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 bitaog plantations and embark on tamanu oil production.

POTENTIAL FOR BITAOG TREE PLANTATION DEVELOPMENT FOR TAMANU OIL

The potential of developing bitaog 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 bitaog trees can produce about 5–100 kilograms of nuts per tree and an oil yield of about 50–70% by weight. The estimated plantation development cost of approximately P29,779.13 per hectare (ha) was used based on DENR Technical Bulletin Nos. 1 and 2 (DENR-Forest Management Bureau 2016).



Fig. 6. Sample tamanu oil product sold in Lazada. (Palma-Torres 2019)

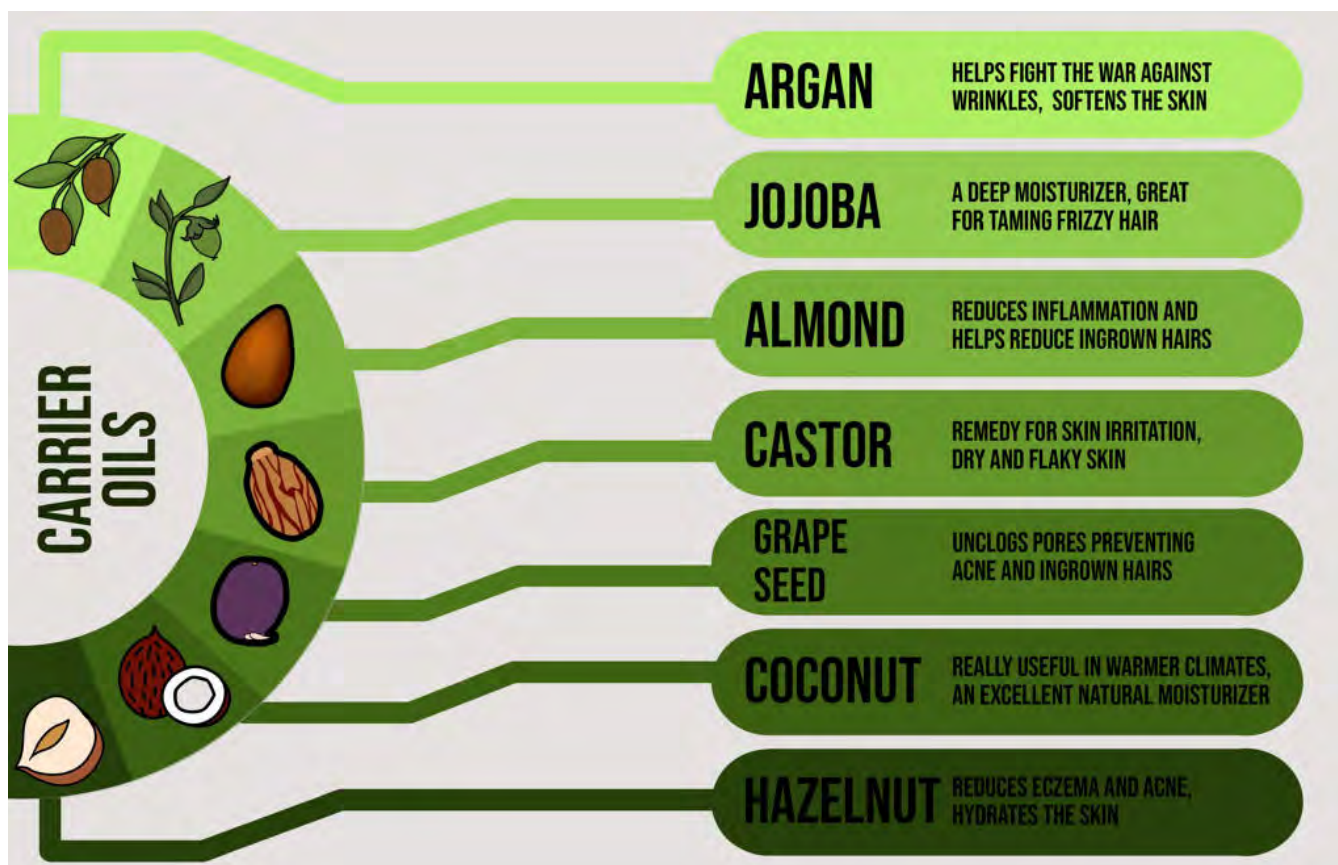


Fig. 7. Infographic on alternative carrier oils. (Prim&Prep n.d.)

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 ranges from P6,400.00/liter (L) to P37,081.42/L.

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 bitaog plantation is attained at low-price and low-yield conditions (P51,140,493), while the highest NPV is at high-price and high-yield conditions (P494,696,598). The resulting internal rate of return (IRR) values are also higher than the existing discount rate of 10%, ranging from 318% to 624%.

This shows that establishing a bitaog plantation for tamanu oil production is profitable. Unlike other NTFPs, growers do not need to wait for an extended period before profits are realized. Income flow from bitaog can start as early as 5 years after establishment. Moreover, bitaog plantations can grow in various

conditions, allowing plantation establishment in a wide range of accessible areas.

MOVING FORWARD FOR THE TAMANU OIL INDUSTRY

Tamanu oil from bitaog, 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 a 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 bitaog to be used to rehabilitate marginal and degraded lands.

If the Philippines decides to develop a tamanu oil industry, concerned agencies and

institutions should craft an R&D agenda that encompasses the market, technical, sociocultural, financial, and environmental aspects of initializing, managing, and developing bitaog resources and the tamanu oil industry.

The following R&D agenda may include:

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

Table 1. Summary of NPV and IRR of a 1-ha bitaog plantation (r=10%, 50-year planning period).

Level	NPV (P/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%

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EDITOR'S NOTE

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