

NARRATIVE REVIEW: ARECA NUT AS A HEALTHY AND HALAL PRODUCT FROM SCIENCE PERSPECTIVE IN PREVENTION OF NONCOMMUNICABLE DISEASES

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Abstract: *One of efforts to improve public health is to utilize medicinal plants obtained from nature, which are economical and do not have side effects. Type of medicinal plants that is often used by people in Indonesia is Areca Nut. Empirically areca nut are able to overcome various types of diseases. The purpose of this review was to provide confidences in the feasibility of areca nut as raw material for medicinal plants and processed products. The results of the study showed that the potential of areca nut as antibacterial, anti-oxidant and control prevention of noncommunicable diseases. The direct use of areca nut is only as an ingredient with betel leaves and only certain people are able to consume it, while the benefits and efficacies are very diverse, innovation is needed to utilize areca nut in the processing of various healthy and halal food products in the form of flour, candy and coffee. Research is needed to determine the right formulation for physical, chemical and organoleptic efficacies, so that a product that is both healthy and halal can be obtained.*

Keywords: *Areca Nut, Disease, Halal*

INTRODUCTION

The use of medicinal plants (herbs) as traditional medicine is one effort to improve public health. The ingredients made can be obtained from nature, which are economical, and do not have side effects like chemical drugs (Hembing, 2008). There is one medicinal plant that is often used by people in Indonesia namely areca nut (*Areca catechu* L.). Areca nut is easy to grow in tropics and is usually planted in the yard, garden, or cultivated. Areca nut has many benefits, from seeds, coirs, leaves, and midribs of Areca nut are used as traditional medicines, including for anthelmintic, wounds and scabies (Dalimarta. S, 2009).

Areca nut is a type of palm tree that is widely available in most of South and Southeast Asian countries. Areca nut in its pure form is harmless and has many medicinal efficacies including for carbuncles, wounds and even cancer healing. Its active principle characteristic, all characteristic and clinical trials have been guaranteed to make effective use of these plant products (Keshava et al., 2018). *Areca palm, Areca catechu* L. in several countries It has been

cultivated such as South and Southeast Asian countries such as India, China, Bangladesh, Indonesia, Myanmar, Thailand, Malaysia, Vietnam, Philippines, etc (Cheriyian H. & Kumar, 2014). The fruits or seeds are referred to as areca nut, areca nut or 'supari'. It is a fibrous, ovoid drupe with a central ruminant endosperm or nut covered by a pericarp (husk) which is green when unripe and orange-yellow when ripe. Peanuts have astringent characteristics and a slightly bitter taste (Ananda.KS, 2004).

Sirih Pinang culture is an unifying symbol of tribal members and as a form of family communication that has value and meaning as a tool for negotiation, lobbying and realm of political communication (Suminar, 2020). Some processing of areca nut is still carried out in most of India. One species known as 'red supari' which is obtained by boiling and drying the unripe areca nuts at various stages of maturity. Another species called 'white supari' which is obtained by simply drying the ripe areca nuts and peeling them later (Selvan MT, Sivaraman K, 2004). Since a long time ago, areca nut is used for chewing because it is believed to have many medicinal efficacies, this plant is also used as medicine in several parts of the world including India, China and other South and Southeast Asian countries (Keshava et al., 2018).

The efficacies of medicinal plants have enormous potential in invention of newer and more efficacious and cost-effective medicines that minimize disease and keep populations healthy without the need for expensive medicines or nutraceuticals (Rahmatullah et al., 2010). People in the world have a habit of chewing areca nut. The use of tobacco together with areca nut is vary in terms of composition and chewing methods from country to country (Gupta.P.C & Warnakulasuriya, 2002). Areca nut is a plant that has many benefits, but is not yet considered a major commodity.

Areca nut production can reach 50-100 pieces/mayang and 150-250 pieces/mayang for smaller sized fruits. The content of tannins and alkaloids are the two dominant compounds in areca nut. The use of areca nut as an ingredients eaten with betel leaves, has become a hereditary habit in certain areas in Indonesia, but its consumers are limited. Empirically areca nut can overcome various types of diseases. In order for the various benefits of areca nut to be enjoyed by many people, there needs to be innovations to utilize areca nut in the processing of various food products, so that it is easy to consume and more benefits will be obtained, especially for health (Barlina, 2007).

Currently, the direct use of areca nut is only as a ingredients with betel leaves and only certain people can consume it, while the benefits and efficacies are very diverse, so it is necessary to use areca nut in the processing of various food products. So that more consumers will feel the benefits of betel nut for health, as well as betel nut cultivation will develop like other palm plants.

METHOD

The methods applied in this study were literature studies sourced from journal articles, proceedings, conferences, online sites that had links or keywords that were in line with the topic of this study. Data acquisition techniques were carried out through online searches such as Google Scholar, Garuda Portal, Pubmed science direct. The search used keywords "Areca

nut, noncommunicable diseases, healthy, halal from the science perspective in the prevention of noncommunicable diseases".

RESULTS AND DISCUSSION

1. Description of areca nut

Areca palms are single trunked palms that can reach 25 meters high or rarely more. The stems are cylindrical, with clear nodular marks, generally ranging from 15–25 cm. The leaves are arranged in a stems rosette, each individual with 8 to 12 leaf blades. Green midrib tube which is wider in the middle. The type of single pinnate compound leaf blade with the length of the middle leaf tends to be larger. Inflorescences appear from under the leaves, branching with short stalks, male and female flowers separate on the flower branches. Female flowers only at the base ranging from 2 to 3, flanked by male flowers and towards the end of the branch entirely only by male flowers. The fruit is between round and elliptical and its size of $5-7 \times 2-4$ cm, when it is ripe the color varies from green, yellow and or orange-reddish (Silalahi et al., 2018).

In general, areca nut is used for *nyirih*, where areca nut which is chewed with betel leaves and lime. The *nyirih* tradition have been carried out by the Malays since 500 years ago, such as in Southeast Asia which includes Malaysia, Thailand, Sri Lanka, and Indonesia (Yudha, 2017). Areca nut plants are spread in almost all parts of Indonesia. Sumatra is one of the largest areca nut cultivation centers, which is 95,532 ha or approximately 66.71% of the total area of areca nut in Indonesia. Areca nut is able to provide a promising income, and become an export commodity in the central areas of areca nut plantations in Sumatra. The area and production of areca nut tend to increase. The area of areca nut in 2000 was 82,561 ha with a dry seeds production of 37,600 tons, and in 2012 the area increased to 143,202 ha (Yudha, 2017) with a dry seeds production of 42,014 tons (Dirjend Perdagangan, 2013).

Areca nut (*Areca catechu*) has long been known to be an alternative or herbal medicine that is efficacious, both for health and beauty. Not surprisingly, many cultivators of this type of coconut. As a plant that belongs to the Arecaceae or Palmae family, areca nut cultivation is quite easy. This plant can be cultivated from its ripe fruit. Although easy, betel nut cultivation must pay attention to several things, such as land conditions, rainfall, and humidity levels. Areca nut can grow well with temperatures between 20° Celsius to 30° Celsius. Areca nut should also get enough sunlight ranging from six to eight hours per day (Yudha, 2017).

2. Epidemiology of areca nut use

Areca nut is used as a chewing agent by about 600 million people worldwide. Most of the world's population engages in areca nut chewing and this practice is endemic throughout the Indian subcontinent, much of South Asia and Melanesia. A wide variety of materials, including tobacco, can be used together with areca, which is a areca nut. The composition and methods of chewing can vary widely from country to country Some populations are known to use areca nut without tobacco, Some trends show a decline in the habit in some countries such

as Thailand while the prevalence of areca nut use is increasing in India and Taiwan. In recent years, areca products have been produced commercially. It is estimated that 10-20% of the world's population chews areca nut in some form, often mixed into betel (pan). countries obtained in hospital-based, population-based and school-based surveys. Although there are no national surveys reporting the prevalence of this habit, data from several of the published studies emerging from a number of population groups studied since the 1970s are listed. While the prevalence points range for areca chewing is wide ($<1 \pm 54\%$), more in women than men who chew and the prevalence of chewing increases with age (Gupta.P.C & Warnakulasuriya, 2002). Chewing betel quid continues to expand in South Asian populations, including immigrant communities outside the region as well as between certain ethnic groups in Southeast Asian countries and also in Taiwan increasing in size (Gupta & Ray, 2004).

The areca and betel nut chewing community has a habit and belief in chewing areca and betel nut, starting from a teachings from their parents and environment which they then imitate. Chewing areca and betel nut is done without knowing the time. Chewing areca and betel nut has been done since the age of children to adulthood today. It is known that chewing areca and betel nut has an impact, it gives a sense of anxiety if you don't consume it, feels stress if you don't chew areca and betel nut, and is like a daydreaming person who has no vision because his eyes feel dark. The situation will be as before when you have chewed areca and betel nut (Ade & Patilaiya, 2017).

Areca nut or Areca catechu is a type of plant that is easily found in Indonesia. Indonesian people know areca nut as a plant that is widely used as a pharmaceutical ingredient, economic commodity, and construction material. The shape of the stem is straight, unbranched and sturdy, resulting in it being used as a land barrier and yard barrier. For the Indonesian people, areca plant is used as a yard plant (Silalahi, 2014) and also as a field barrier (Silalahi et al., 2018).

3. Areca nut as a source of antioxidants

Several studies have shown that plants and fruits prove useful in protecting the human body against the dangers of free radicals. This is due to the antioxidant activity contained in these plants. Naturally, plants that contain antioxidants are scattered in various parts of the plant such as roots, stems, shells, twigs, leaves, fruits, flowers and seeds (Hutapea. R, 2005). The antioxidant activity of flavonoids is their ability to release protons so that they can capture free radicals and also play a role in binding metals (*chelating agents*) (Borsari et al., 2001). The antioxidant activity of tannins is due to the presence of cyclic groups and their ability as proton donors such as flavonoids. Also in the formation of complexes with metals (Perron & Brumaghim, 2009).

The antioxidant activity of the methanol extract of Yaki Areca Nut had a better value than the resulting fraction. The antioxidant activity of the methanol extract of Yaki Giseke Areca Nut had an IC₅₀ value of 8.3 ppm. Based on the partitioned fraction of the methanol extract of Pinang Yaki, the ethyl acetate fraction had better antioxidant activity than other fractions. The IC₅₀ value of the ethyl acetate fraction was 10.90 ppm and the IC₅₀ value of

the n-hexane fraction was 80.80 ppm, and the IC₅₀ value of the water fraction was 12.85 ppm (Filbert et al., 2014). Areca nut contained antioxidant compounds that can inhibited free radicals such as tannins and flavonoids. Extracted areca nut used 95% ethanol has a yield of 21.6%, thick consistency, brown color and distinctive odor with a water content of 23.7%, an ash content of 0.795 and an acid insoluble ash content of 0.005% and has an antioxidant activity of 3.5 g/ ml, in the strong category. areca nut extract met the requirements of standard extract ingredients and has activity (Cahyanto, 2018).

The ethanol extract of yaki areca nut (*Areca vestiaria*) seeds has antioxidant activity. Total antioxidants are 3,80375 mmol/100g. b. The total flavonoids contained in the fresh yaki areca (*Areca vestiaria*) seed extract was 7.573 mg/kg (Samosir et al., 2012). The ethanolic extract of *Areca catechu* seeds (25-100 µg/mL) for 48 hours inhibit cell growth by 13-84% (IC₅₀ 77 µg/mL), arekoline treatment (10-500 g/mL) resulted in 8-500 g/mL inhibition of cell growth 73% (IC₅₀ 180 µg/mL). The study found that the ethanolic extract of areca nut (*Areca catechu*) has antiproliferative activity against MCF-7 cells by inhibiting growth and leading to apoptosis (Meiyanto et al., 2008). Areca and betel nut shell extracts (*Areca catechu* L.) contains compounds that have potential as antioxidants and cytotoxics. The ability of antioxidant activity in areca and betel nut shells is influenced by secondary metabolite compounds that play an active role in it, namely flavonoid, alkaloids, phenolics, and terpenoids compounds. The strongest antioxidant activity was found in the n-hexane fraction of 17.85 ppm, the methanol fraction of 29.42 ppm, the methanol extract of 30.399 ppm and the ethyl acetate fraction of 45.11 ppm (Petrina et al., 2017).

4. Areca nut as a source of antimicrobials

The ethanol extract of young areca nut (*Areca catechu*) had antimicrobial activity that causes mouth ulcer, which can produced a killing zone for *Streptococcus sanguis* bacteria and *Candida albican* fungus with an effective concentration of 15% extract (Lilyawati et al., 2019). Areca nut seed extract was able to inhibit the growth of *S. aureus* bacteria, with the best inhibition at 50% concentration and can be used as an alternative to herbal medicine (Dalinatola, 2016). The water fraction and the ethyl acetate fraction were able to inhibit the growth of MRCNS bacteria at concentrations of 512 g/mL and 256 g/mL, respectively, while the n-hexane fraction inhibited the growth of 1024 g/mL. There are tannin and phenol compounds in the water and ethyl acetate fractions. concluded, areca nut extract can inhibited the growth of MRCNS bacteria by destroying the bacterial cell wall (Nursidika, 2019).

The inhibition of areca nut against bacteria was due to the presence of active compounds with antimicrobial properties such as alkaloids, arekoline, arekolidin, arekaine, guvakoline, guvasine, and isoguvasine. In addition, it contained red tannins, fat, starch, and resin (Z. Zhang et al., 2013). Arekolin, an alkaloid compound found in areca nut, which has cytotoxic properties against bacterial cells (Chandak & Rawlani, 2013). Compounds that were known to inhibit MRSA bacteria were phenols (Nursidika, 2019). The ethanol extract of areca nut contained various phenolic compounds. Phenol worked on microorganisms in 2 different ways: inhibiting bacterial growth or killing bacteria (Daniela et al., 2013).

The ethyl acetate fraction, which contained many phenolic compounds, had been shown to inhibit the growth of MRCSN bacteria at the lowest concentration of 256 g/mL. The mechanism for microbial activity of phenols, which were abundant in areca nut, disrupted the structure of MRCNS bacteria. Observations showed that the structure of the bacteria was destroyed and the cell walls of the bacteria were no longer visible (Nursidika, 2019).

Areca nut (*Areca catechu L.*) seed extract was able to inhibit the growth of *Salmonella typhi*. with Minimum Inhibitory Concentration (MIC) in areca nut (*Areca catechu L.*) seed extract at a test concentration of 1% while the minimum kill concentration was not obtained because all Nutrient media required growth. Areca nut (*Areca catechu L.*) seed extract only inhibited (bacteriostatic) but did not kill (bacteriocidal) of *Salmonell typhi* in the concentration of this study (Selpiah & Ustiaty, 2021).

5. Areca Nut as a Non-Communicable Disease Prevention and Control Plant.

Noncommunicable diseases were about 71 percent of death causes in the world that killed 36 million people per year. About 80 percent of these deaths occur in middle- and low-income countries. 73% of deaths were currently caused by noncommunicable diseases, 35% of them due to heart and blood vessel disease, 12% by cancer, 6% by chronic respiratory diseases, 6% due to diabetes, and 15% due to other NCDs (Dirjend PTM, 2019).

Disease prevention is a worldwide problem. There is a need to identify genuine natural plant sources to obtain recognized medicinal characteristics, which can be used as new therapies for various diseases. It is known the usefulness of areca nut as herbal medicine and the prospect of its therapeutic application. Areca nut has been used for medicinal properties for more than 2000 years in South Asian countries. In fact, various pharmacological activities have been found in betel nut extract or its constituents (Amudhan et al., 2000).

In China, there were already more than 30 medicines that were formulated and marketed using areca nut as one of the ingredients. Apart from the medicinal characteristics of areca nut, it was also marked as carcinogenic by some researchers. It was confirmed that areca nut in its pure form is harmless but has many medicinal characteristics including cured ulcers, wounds and even cancer (Keshava et al., 2018).

Aceh areca had antihyperglycemic activity that can increased GLUT4 density through activation of the PI3K pathway and elevation of GLUT4 translocation. Aceh areca was also a phytoconstituent that had antiproliferative activity against cancer cells through certain mechanisms of action such as nuclear DNA fragmentation, inhibition of NF-kB activation, inhibition of AMPK phos phorylation, and an increase in intracellular ROS that triggered the cell cycle to stopped and cancer cells underwent apoptosis (Sari et al., 2020). Ethanolic extract as an anticancer compound that can inhibit proliferation and stimulate apoptosis of MCF-7 cells (breast cancer cells). Areca nut was known to contained antioxidant compounds that had the potential as anticancer. Standardization of the ethanolic extract of *Areca catechu* fruit seeds (EP) was carried out according to BPOM standards (Departemen Kesehatan RI, 2000).

Areca nut had an inhibitory effect on *angiotensin converting enzyme* (ACE). Oral administration of arecanut in rats with spontaneous hypertension produced a dose-appropriate anti-hypertensive effect. The response to doses of 100 and 200 mg/kg was proportional to captopril of 30 and 100 mg/kg. Intravenous administration of arecanut to these rats resulted in a rapid and significant decrease in blood pressure at doses of 10 and 15 mg/kg. The maximal antihypertensive effect of arecanut at an iv dose of 15 mg/kg was 5 times greater than the effect of captopril at the same dose.

There was an increase in blood glucose levels after 30 and 60 minutes of maltose administration, but if accompanied by 250 mg/kg and 500 mg/kg arecanut extract, there was significant suppression when compared to the control rat group at 30 and 60 minutes after administration. These results indicated that arecanut extract was a potent alpha-glucosidase inhibitor and could reduce blood glucose levels effectively after oral administration of maltose (Amudhan et al., 2000).

The administration of areca nut extract could reduce plasma LDL levels in atherosclerotic rats, namely in the following studies: Group 1 (mean total LDL plasma = 290.52), Group 2 (mean total LDL plasma = 107.19), group 3 (mean total LDL plasma = 107.19) 35.32), and the decrease was more significant in group 4 (mean total plasma LDL=13.23) (Anggraeni, 2013).

6. Areca nut as a healthy and halal product from a scientific perspective

In some European countries, such as the UK, areca nut was needed to meet the demands of the South Asian community living in the country. In Germany, Belgium, the Netherlands, South Korea, and China it was used for pharmaceutical raw materials. Areca nut from Indonesia was in great demand or in other words 80% of the world's need for areca nut was met from Indonesia. The export of areca nut was a natural product that had very promising business opportunities because of the very high demand accompanied by the abundance of existing raw materials (Yudha, 2017). The Ministry of Trade (Kemendag) released the initial export of 18 tons of areca nut with a total value of US\$1.5 million to Saudi Arabia, which was a collaboration between the Jambi Provincial Government and PT Best Star Indonesia. Areca nut was one of the export commodities with a positive growth trend, especially in the last three years. In 2018, the total export of areca nut to world countries was recorded at US\$4.2 million and increased to US\$11 million in 2020. Areca nut imported from Indonesia was generally used by South Asian expatriates living in Saudi Arabia for *nyirih*. *Nyirih* is a way of enjoying areca nut by chewing. The habit of areca nut was similar to the Indonesian people habit (MUI LPPOM, 2021).

The perspective of Islamic law, especially the study of fiqh muamalah on the practice of buying and selling skinned areca nut in Siau Village, Muara Sabak Timur District, Tanjung Jabung Timur Regency, Jambi Province has fulfilled the pillars and conditions of buying and selling or not contradicting religion (Samsudin, 2018). MUI Halal certification on food products, medicines, cosmetics and other products was carried out to provide certainty of halal status, so as to reassured consumers in consuming them. The continuity of the halal

production process is guaranteed by the producers by implementing the Halal Assurance System (MUI LPPOM, 2021).

Currently, the direct use of areca nut is only as an ingredient in betel leaf and only certain people can consume it, while the benefits and efficacy are very diverse, there is a need for innovation to utilize areca nut in the processing of various food products. Such as turning into candy, turning into flour that is formulated with tuber flour into processed products, so that more consumers will feel the benefits of areca nut for health, as well as areca nut cultivation will develop like other palm plants (Barlina, 2007).

Some consumers in China thought that consuming areca nut can also prevented drowsiness, so this can be an inspiration to processed areca nut into flour and then formulated with coffee bean flour, so as to produce a new formula, namely kopi-pinang. However, it needed to be tested to determine the right formulation and then carried out several tests, including physical, chemical and organoleptic characteristics, so that the right formula can be obtained (Barlina, 2007).

Food processing with instant areca nut coffee powder, areca nut and coffee were used as the main raw materials; the taste of areca nut and the aroma of coffee feels and fits in the mouth harm to the oral cavity was avoided, refreshing instant areca nut coffee powder was a good taste food, and had important practical value in increasing the value of agricultural products, and food flavor variations (Haide et al., 2015).

CONCLUSION

Areca nut is a natural product that has very promising business opportunities. 80% of the world's demand for areca nut is met from Indonesia. Areca nut with potential as a source of antibacterial, as an anti-oxidant, and as a prevention and control of noncommunicable diseases. Furthermore, innovation is needed to be developed as food products made from areca nut such as flour, coffee, candy. research is needed for the right formulation of physical, chemical and organoleptic characteristics, so that a product that is both healthy and halal can be obtained.

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