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ETHNOBOTANICAL STUDY OF BERANGAN (*Castanopsis* spp.) IN NAGAN RAYA DISTRICT INDONESIA

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ABSTRACT

Castanopsis spp., also known as berangan in Acehnese, is a chestnut species that is still used and well-known by the people of Indonesia. However, it is currently very rare and is becoming less well-known to today's younger generation. This research aims to study and understand how people in Nagan Raya process and use *Castanopsis* spp. species. Data were collected using two methods: ethnobotanical data and population data. The participatory rural appraisal (PRA) method was used in direct interviews to collect ethnobotanical data. Purposive sampling was used to obtain the *Castanopsis* spp. the population as much as local informants could show. There were 48 people from three groups of respondents who provided ethnobotanical data: traditional figures, farmers, and villagers who *Castanopsis* spp. species. The respondents in this study were divided into three groups based on their age, education, and occupation. There are 2 types of *Castanopsis* spp. that have been found in the Nagan Raya district, *Castanopsis inermis* and *Castanopsis costata*. They were discovered in forest areas, plantations, office/home yards, and roadside areas. *Castanopsis* spp fruits are commonly used as food, while the wood are usually used as carpentry/furniture wood and firewood.

Kata Kunci: ethnobotany, berangan, chestnut, *Castanopsis* spp.

INTRODUCTION

Indonesian forests are mostly classified as tropical rainforests with high biodiversity [1]. Many of the plants in it have not been thoroughly studied for their benefits and uses in human welfare. Humans have benefited from

forests since ancient times because they provide various primary needs such as clothing, food, and shelter [2].

Community interaction with plants in everyday life is one way to learn about how plants are used in the community. An ethnobotanical approach will make it simple to find basic information about the benefits of plants, such as medicines, food, and various other important preparations. Ethnobotany is frequently used to determine people's knowledge of how to use various types of plants that have numerous benefits [3].

Castanopsis spp., also known as berangan in the local language (Acehnese), a chestnut species, is a plant that is still used and well known by the people of Indonesia [2]. This is a woody plant with a lot of potentials, such as a building material or food source [4]. Chestnut is not only popular in Indonesia; but foreign communities have also consumed its fruit. Germany has planted *Castanopsis sativa* chestnut trees in a 450-hectare garden with a population of 35,000 trees for fruit seeds to be used as a new food source [5].

Although Indonesia has the potential to develop this chestnut plant, it does not yet have a chestnut planting industry like those found elsewhere. Chestnut is commonly used as a shade plant in plantation areas, as logs (timber) or wood that has been cut into pieces and is ready to be sold as lumber, and has edible fruit. Chestnuts are typically served as food by roasting or boiling; the flavor is similar to peanuts [2].

Several species of chestnut play important roles as key species in forest ecosystems, including as food for various animals [6]. There are approximately 120 species of chestnut found worldwide, with Southeast Asia having the greatest distribution (Indochina and Malesia). The Malesia region recorded 34 species, the majority of which were found in Indonesia (approximately 24 species). The largest distribution of chestnut species is in Kalimantan, followed by Sumatra and Java. *Castanopsis* spp. grows from the lowlands to the mountains at elevations ranging from 0 to 2500 m above sea level. Most grow at altitudes ranging from 0 to 500 meters, while no *Castanopsis* spp. grow above 2700 meters. There are 11 species of Castanopsis found at altitudes of 0-500

m in Sumatra, namely: *Castanopsis rhamnifolia, Castanopsis johorensis, Castanopsis malaccensis, Castanopsis tungurrut, Castanopsis javanica, Castanopsis acuminatissima, Castanopsis schefferiana, Castanopsis argentea, Castanopsis fulva, Castanopsis costata,* and *Castanopsis inermis* [7].

Chestnut is also quite well known among the people of Aceh, especially on the west coast of Aceh. The results of a survey conducted in the Nagan Raya Regency area, the local community is quite familiar with chestnut trees. This plant is known by the local name "*Boh brangkah*".

According to interviews with locals, in 1990-2000, during the harvest season chestnuts could be easily found in traditional markets. Based on the discussions with the surrounding community, chestnuts are currently very rare and are becoming less well-known to today's younger generation. This is presumably due to a lack of knowledge about the plant's potential. Other factors influencing chestnut reduction include rampant illegal logging and forest conversion. One of the most common is the conversion of forest functions into oil palm plantation areas in the Nagan Raya District. This situation is influenced, according to the people of Nagan Raya, by the presence of private palm oil processing companies in the area, which provides opportunities for economic growth and family welfare. Furthermore, the value of easy palm oil maintenance and the results obtained provide sufficient benefits.

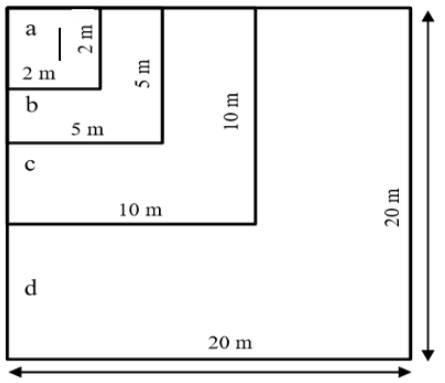
The frequent occurrence of land clearing to cultivate certain plant species without education and ethnobotanical studies will result in reduced and uncontrolled forest land cover, as well as a reduction in the diversity of endemic flora and fauna in an area [8]. Ethnobotanical studies of chestnut (*Castanopsis* spp.) in Nagan Raya District are deemed important in order to be designated as information on forest potential and to promote one of the plant species that has become scarce so that it is included on the list of plant species for conservation. The goal of this study was to collect data on the *Castanopsis* spp. population in Nagan Raya and to investigate its ethnobotany, commencing with the species used, how it is used, and how it is processed by the community.

RESEARCH METHOD

This study was carried out between January and October of 2021. The research was conducted in the Nagan Raya Regency area. Direct interviews were used to collect ethnobotanical data using the participatory rural appraisal (PRA) method, which involved the community in research through semi-structured interviews guided by several questionnaires.

Purposive sampling was used to select sub-districts and villages for research based on the presence of *Castanopsis* spp. in the field. Respondents in each selected village were divided into three groups: a traditional leader in each village, farmers who possessed *Castanopsis* spp. in their fields, or at least 5 people in each village, and residents who have used chestnut (traders, consumers, and chestnut collectors). The characteristics of the respondents chosen for the interview were determined by their age, education, and occupation. The ethnobotanical study looked at the parts of *Castanopsis* spp. species that are used, their uses, and how they are processed.

Sampling for identification was done at every location where *Castanopsis* spp. was discovered. The forest area indicated by respondents for the presence of *Castanopsis* spp. was observed using the nested plot method, which was placed based on where *Castanopsis* spp. was found. Total of 5 nested plots are placed at each determined location point of the forest area. The first plot represents the initial location of *Castanopsis* spp., while the other four plots are determined by the four cardinal directions. The plots are 50 meters apart. Each observation plot was carried out by collecting samples from each *Castanopsis* spp growth level, which is seedlings, stakes, poles, and trees [9]. The criteria for each stratum are presented in **Figure 1**.



Keterangan:
a. Semai <1,5 m
b. Pancang ≥1,5 m dan diameter <10 cm
c. Tiang dengan diameter 10 sampai < 20 cm
d. Pohon dengan diameter ≥20 cm

Figure 1. The design of the nested plot method

Identification and preservation of samples of *Castanopsis* spp. were carried out at the Acehense Herbarium, Department of Biology, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Banda Aceh. The sample identification process is carried out on morphological characteristics which include root, stem, leaf, flower, fruit, and seed organs (if all of these organs are available in each type). Identification of the sample was carried out by matching the sample with the existing sample in the herbarium, then a literature study was carried out on morphological features using an identification book, and verifying it to a taxonomist.

RESULTS AND DISCUSSION

Composition of *Castanopsis* spp.

The study indicates that *Castanopsis* spp. were extremely rare in village and forest areas. This is because the conversion of forest functions into oil palm plantations is becoming more common in Nagan Raya Regency, resulting in the degradation of natural forest trees, particularly *Castanopsis* spp. We found only two types of Berangan (Castanopsis spp.) in the area, *Castanopsis inermis* and *Castanopsis costata* (Table 1).

Table 1. *Castanopsis* spp. species found in Nagan Raya District

No	Scientific name	Local name	District	Discovered location	∑ Ind
1.	*Castanopsis inermis* (Lindl. & Wall.) B. & H	Brangkah padee	Kuala	Side of the road and plantation area	4
			Sukamakmue	Home and office yard, the plantation area	8
			Seunagan Timur	Forest	17
			Beutong		2
			Tadu Raya	Plantation area	2
			Darul Makmur	Plantation area	1
				Plantation area	
2.	*Castanopsis costata* (Bl.) A.DC.	Brangkah bui	Kuala	Side of the road	1
Jumlah Total					**35**

Castanopsis inermis was the most common type of chestnut we discovered, with 34 individuals scattered across several sub-district locations and several locations found, whereas *Castanopsis costata* was only found in one individual across one sub-district location in the Nagan Raya Regency. The largest amount of *Castanopsis* spp. individuals were found in forest areas (48.5%), while the smallest number of people were found on the side of the road, with a percentage of 2.9% (Figure 2). This is because of natural dispersion in the forest, particularly by animals. The fruit of *Castanopsis* spp. is a natural food source for a variety of forest wildlife, especially primates [10]. It plays significant roles and provides numerous benefits to forest ecosystems.

Both types of *Castanopsis* spp. are found in Sumatra and have distinct characteristics that can be seen on the leaves and fruit. *Castanopsis inermis* has leathery leaves with hairless leaf surfaces and a fine thorny capule covering the fruit. *Castanopsis costata*, on the other hand, has thicker leaves with a fine hairy leaf surface, and the fruit is covered by a sharp thorny shell (capule), similar to a sea urchin.

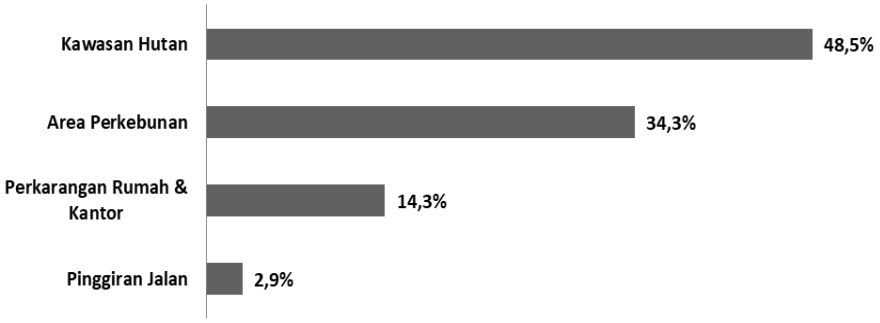


Figure 2. Percentage of individual Castanopsis spp. found in Nagan Raya District.

***Castanopsis inermis* (Lindl. & Wall.) B. & H**

Castanopsis inermis is a Fagaceae family member (syn. *Castanopsis sumatrana*). It is found in Peninsular Malaysia, Myanmar, the Philippines, Thailand, and Sumatra [11]. This plant's native habitat is the primary rainforest zone with a tropical climate. It grows in lowland forests up to 600 meters above sea level. This plant is also known as Braided Berangan, Berangan, Berangan Betul, Berangan Makan, Berangan Padi, Parang Berangan [12]. The tree has an irregular crown and measures 16 m - 30 m in height. The bark is a rough gray color. The leaves are stalked and spirally arranged, with leathery leaf blades that are invertedly sharp and measure 5.1-11 cm. The top of the leaf blade is hairless, but the underside is covered in hair. Male, female, and bisexual shoots range in length from 10-15 cm. The male and female flowers can grow alone or in groups with 3-7 male and 3-4 female flowers. [13].

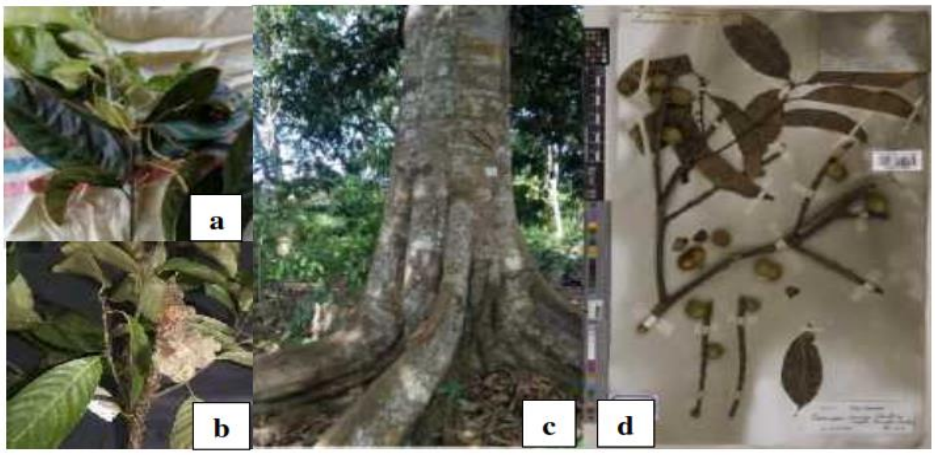


Figure 3. Morphological characteristics of *Castanopsis inermis*, a). Leaves, b). Fruit, c). Stems, and d). Herbarium.

***Castanopsis costata* (Bl.) A.DC**

Castanopsis costata belongs to the Fagaceae family whose distribution is found in Peninsular Malaysia, Borneo, Thailand, and Sumatra [11]. This tree grows in mixed dipterocarp primary forest in lowlands to mountain forests at altitudes up to 1900 meters above sea level [14].

Castanopsis costata is locally known as Berangan dan Berangan Bukit. The tree can reach a height of 36 meters and a diameter of 80 centimeters. The whitish skin is smooth or scaly, and the inner skin is yellowish and fibrous.

Sapwood (the wood between the bark and the heartwood) is pale yellow [12]. The leaves are coriaceous (having a skin texture) or sometimes thick coriaceous and glabrous (smooth) on the surface. Male flowers are arranged in groups of 2-3 or solitary along the rachis (the maternal part of the stalk in the center of the inflorescence to which the individual flower stalks are attached), whereas female flowers are arranged in groups of 3 or solitary along the rachis [14].

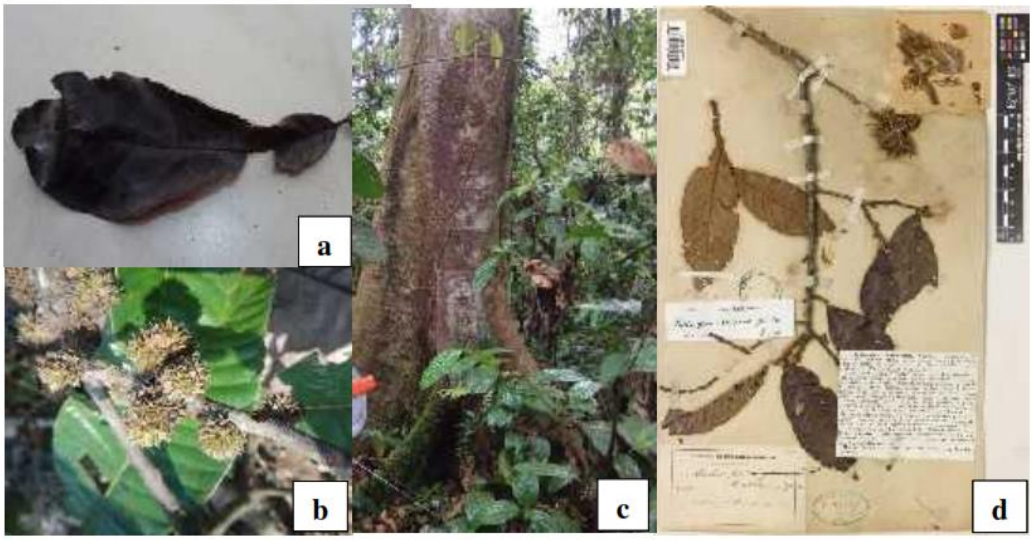


Figure 4. Morphological characteristics of *Castanopsis costata*, a). Leaves, b). Fruit, c). Stems, and d). Herbarium

Ethnobotany of *Castanopsis* spp.

According to the local community in Nagan Raya District, Castanopsis spp. has been used for food, carpentry wood, and firewood. These findings were obtained from respondents who played a role in providing information to as many as 48 people, divided into three groups: traditional leaders, farmers, and villagers who use Castanopsis spp. The number of data samples collected from traditional leaders ranged from 16 to 32 people, including farmers and residents who knew the location of *Castanopsis* spp. The characteristics of the interviewees were based on their age, which ranged from 30 to 60 years old, and their educational background, which was dominated by high school graduates with a general livelihood as a farmer or gardeners. Fruit and wood are the parts of *Castanopsis* spp. that are used. The use of *Castanopsis* spp. by the community in Nagan Raya Regency is presented in **Table 2**.

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Table 2. Utilization of Castanopsis spp. by the people of Nagan Raya Regency

No	Scientific name	Local name	Utilized part	Utility
1.	*Castanopsis inermis* (Lindl. & Wall.) B. & H	Brangkah padee	Fruits and wood	Food, carpentry wood, and firewood
2.	*Castanopsis costata* (Bl.) A.DC	Brangkah bui	Fruits and wood	Food, carpentry wood, and firewood

***Castanopsis* spp. as a food sources**

People in Nagan Raya Regency frequently use chestnut as a complementary food. The fruit is the most commonly consumed part of this plant [15]. Some people use it as an extra ingredient in porridge or compote. Roasting and boiling are the processing methods. Traditional markets sell chestnut fruit in the form of seeds that have been peeled with a price range between IDR 10,000-20,000/ kg.

Carpentry/Furniture Wood

Castanopsis spp. is frequently used in the production of cabinets, bookshelves, and other home furnishings. The wood used must have a large diameter and a height of at least 30 meters. It is a strong and long-lasting wood [16]. The disadvantage of this wood is that it cannot be directly exposed to rainwater because it will accelerate the weathering process. To protect the wood from water and wood

pests, residents coat it with lime paint or wall paint.

Energy sources

The people of Nagan Raya Regency have a central brick-making area. The process of making these bricks necessitates the use of wood for burning on the stove. Chestnut wood can also be used as a source of heat-producing energy in the brick-burning process. The residue from cutting wood that has become a board, such as small branches and remaining pieces of board, is often used.

CONCLUSION

The Nagan Raya Regency is home to two Castanopsis spp. species: *Castanopsis inermis* and *Castanopsis costata*. *Castanopsis inermis* was the most common type of chestnut discovered, accounting for 34 individuals, while *Castanopsis costata* was only found in one. *Castanopsis* spp. individuals are most commonly found in the forest, with a percentage of 48.5%, while roadside areas have the fewest, with a percentage of 2.9%. *Castanopsis* spp. is used as food, furniture materials, and daily energy sources, as well as in the brick manufacturing industry. Fruit and wood are the parts of *Castanopsis* spp. that are used.

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