

## UTILIZATION OF PIJI PALM [*Pinanga coronata* (Blume) Blume] BY PEOPLE AROUND BATURRADEN BOTANICAL GARDEN, BANYUMAS REGENCY, CENTRAL JAVA

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**Abstract:** Baturraden Botanical Garden is an ex-situ plant conservation area at the foot of Mount Slamet, Central Java. People around this botanical garden continue to live traditional lives, utilizing plants in their daily lives, including the Piji palm (*P. coronata*). However, knowledge regarding the use of the *P. coronata* palm in Indonesia has never been reported; therefore, it needs to be explored to increase ethnobotanical information. This study aimed to obtain utilization information from *P. coronata* in daily life. The study was conducted in April 2024 in the area around Baturraden Botanical Garden, Baturraden District, Banyumas Regency, Central Java. Information was collected using an interview method using a snowball sampling technique with 37 respondents who were deemed to have broad and specific knowledge of the use of *P. coronata*. The data obtained was analyzed descriptively and qualitatively. The results showed that people around the Baturraden Botanical Garden utilize *P. coronata* from nature (growing wild) to support daily life, which is divided into 8 (eight) aspects, including traditional medicine (fruit and shoot parts), ornamental/decorative plants (whole plants and leaves), environmental role (whole plants, stems, and leaves), building materials (stems and leaves), animal feed (leaves and fruit), food ingredients (stem shoots), ritual/culture (leaves and fruit), and handicrafts/tools/toys (stems, leaves, and fruit). The three parts of *P. coronata* that have high potential and economic value in the industry include the whole plant (ornamental/decorative plants), leaves (crafts), and stem shoots (traditional medicine and food).

**Keywords:** Arecacea; conservation; ethnobotany; palm

**Abstrak:** Kebun Raya Baturraden merupakan kawasan konservasi tumbuhan *ex situ* yang berada di kaki Gunung Slamet, Jawa Tengah. Kehidupan masyarakat di sekitar kebun raya ini masih tradisional, sehingga pemanfaatan tumbuhan dalam kehidupan sehari-hari masih dilakukan seperti pemanfaatan palem Piji (*P. coronata*). Namun demikian, pengetahuan terkait pemanfaatan palem *P. coronata* di Indonesia belum pernah dilaporkan, maka dari itu perlu digali untuk menambah informasi etnobotaninya. Studi ini bertujuan untuk mendapat informasi pemanfaatan *P. coronata* oleh masyarakat di sekitar Kebun Raya Baturraden dalam kehidupan sehari-hari. Penelitian dilakukan pada bulan April 2024 di daerah sekitar Kebun Raya Baturraden, Kecamatan Baturraden, Kabupaten Banyumas, Jawa Tengah. Pengumpulan informasi dilakukan dengan metode wawancara dengan teknik *snowball sampling* terhadap 37 orang responden yang

dianggap memiliki pengetahuan yang luas dan spesifik dari pemanfaatan palem *P. coronata*. Data yang diperoleh dianalisis secara deskriptif dan kualitatif. Hasil menunjukkan bahwa masyarakat di sekitar Kebun Raya Baturraden memanfaatkan *P. coronata* dari alam (tumbuh liar) untuk mendukung kehidupan sehari-hari yang terbagi dalam 8 (delapan) aspek, antara lain: pengobatan tradisional (bagian buah dan umbut), tanaman hias/dekorasi (tumbuhan utuh dan daun), peran lingkungan (tumbuhan utuh, batang, dan daun), bahan bangunan (batang dan daun), pakan ternak (daun dan buah), bahan pangan (umbut), ritual/budaya (daun dan buah), dan kerajinan tangan/alat/mainan (batang, daun, dan buah). Tiga bagian *P. coronata* yang memiliki potensi dan nilai ekonomi yang tinggi dalam industri antara lain: tumbuhan utuh (tanaman hias/dekoratif), daun (kerajinan), dan umbutnya (obat tradisional dan makanan).

**Kata kunci:** Areaceae; etnobotani; konservasi; palem

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## Introduction

Areaceae (palm family) is a member of the monocot plants with the largest number of species. According to Henderson (2002) and POWO (2024), there are 183 genera and around 2,500 species of palms spread throughout almost all tropical regions and many warm climate regions. The aesthetic appearance, uniqueness, diversity of species, and benefits of palms are a special attraction for botanists (Henderson, 2002; Alandana et al., 2015). At least around 60 genera and 1000 species of palm grow in Indonesia, and some of those that grow wild or semi-wild are used by the community for food, wood, and decoration purposes (Davis, 1988; Alandana et al., 2015; Rizmasari et al., 2023). 15 species of wild palms are used for economic purposes, one of which is the *Pinanga* clan, which is widely used as traditional medicine by people in the Malay Peninsula and the Philippines (Balick et al., 1990). One species that is widely used to support people's daily lives is the forest palm [*Pinanga coronata* Blume (Blume)], such as for bird food, medicine, and rituals (Davis, 1988; Balick et al., 1990; Burkill, 1935).

*Pinanga coronata* is often found growing wild in lowland to highland areas up to an altitude of 1,900 meters above sea level (Witono et al., 2002; Direktorat Jenderal Konservasi Sumber Daya Alam dan Ekosistem, 2018). One location that is often found is the Mount Slamet forest area, including the Baturraden Botanical Garden (Zulkarnaen et al., 2021; Zulkarnaen et al., 2022). In the Mount Slamet area, *P. coronata* is often found on forest edges, open areas, and under the canopy at an altitude of 750–1,900 meters above sea level (Witono et al., 2002; Zulkarnaen et al., 2022).

The Baturraden Botanical Garden is one of 36 botanical gardens in Indonesia that are under regional government (Apriyanto, 2022; Hotimah et al., 2021; Apriyanto et al., 2022) is located at Baturraden Wanawisata, Baturraden District,

Banyumas Regency, Central Java. This 143.5-ha botanical garden is located in the mountain rainforest ecoregion of West Java with an altitude of 700–1200 meters above sea level and has a theme of Javanese mountain plants (Irawan et al., 2015; Manalu et al., 2015; Purnomo et al., 2015; Purnomo et al., 2020). The existence of the Baturraden Botanical Gardens as an ex-situ conservation area plays an important role as a center for plant conservation, including palms, and life support for the surrounding peoples (Purnomo et al., 2015; Purnomo et al., 2020; Zulkarnaen et al., 2021).

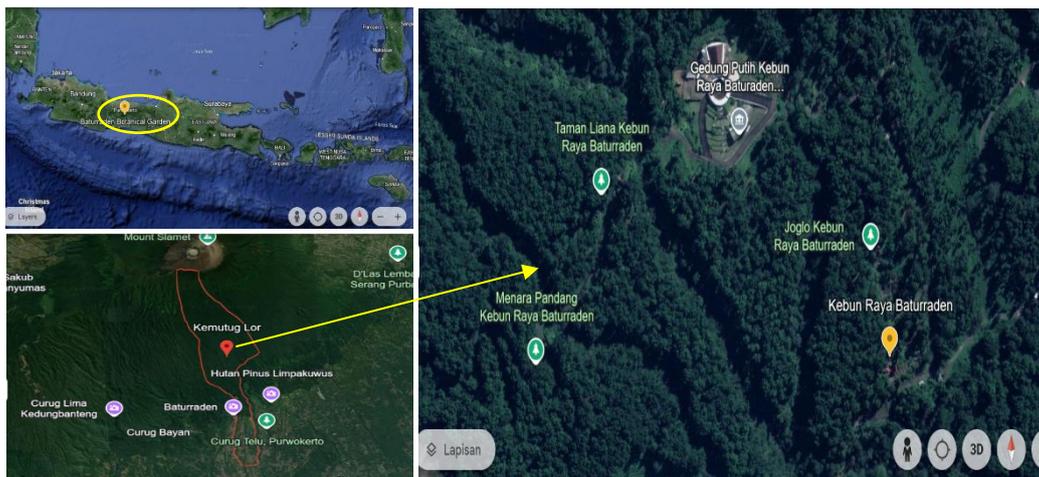
The lives of the people around Baturraden Botanical Garden are still traditional, especially in Kematug Lor village (Pemerintah Desa Kematug Lor, 2024), because they still behave, think, and act by always adhering to the norms and customs passed down from generation to generation, such as in using plants in everyday life (Kamus Besar Bahasa Indonesia, 2024). One plant species still commonly used by peoples around the Baturraden Botanical Garden is the *P. coronata* palm. They use this palm to support activities in their daily lives, such as for livestock feed, rituals, food, and so on. However, research examining aspects of the use of *P. coronata* has never been reported. This research aims to analyze knowledge about *P. coronata* using by the people around the Baturraden Botanical Garden in daily life. It is hoped that the information obtained can become a reference in developing and preserving *P. coronata* based on local wisdom.

## Study Site and Methods

### *Study area*

The research was conducted in area around Baturraden Botanical Garden, Kematug Lor Village, Baturraden District, Banyumas Regency, Central Java, which is in the area around the Baturraden Botanical Gardens (Figure 1). The Baturraden Botanical Gardens has a sloping to hilly topography with a slope of 20-70%, a temperature of 20-30°C, and air humidity of 80-90%. This 143.5-ha botanical garden is located at an altitude of 702-1076 meters above sea level and coordinates 7°18'22"S – 109°13'56"E (Manalu et al., 2015; Kebun Raya Baturraden, 2016; Nofrianti et al., 2021; Dewi et al., 2021). Research and data collection were carried out in April 2024.

Saniyatun Mar'atus Solihah, Mega Atria & Joko Ridho Witono : Utilization of Piji Palm [*Pinanga coronata* (Blume) Blume] by People Around Baturraden Botanical Garden, Banyumas Regency, Central Java



**Figure 1.** The research location is around the Baturraden Botanical Garden, Kemutug Lor Village, Baturraden District, Banyumas Regency, Central Java. Image source: modified Google Earth, 2024

### *Data collection*

Data collection was carried out using semi-structured interviews, structured interviews, and direct observation in the field. Semi-structured interviews were conducted with 5 respondents who live around the Baturraden Botanical Garden using direct interviews using questionnaire questions such as the local name of *P. coronata*, parts used, method of use, and plant status (wild/cultivated). Semi-structured interviews were conducted to strengthen information due to direct on-site interviews with local people. Structured interviews were conducted using the Google Form application containing questions related to the use of *P. coronata* for 32 respondents with the following criteria: (1) live in Banyumas Regency and its surroundings; (2) come from Banyumas Regency and its surroundings but live abroad outside the city; (3) have lived in the Banyumas Regency and surrounding areas, and (4) male or female aged 17 years to 65 years or more. Direct observations in the field were carried out by directly observing the lives of the people around the Baturraden Botanical Garden.

The total number of respondents from the two interview techniques was 37 respondents selected using the snowball sampling technique (Blernackl, 1981; Sugiyono, 2013; Handayani, 2015). The selection of respondents was carried out by determining people who were considered to have broad and specific knowledge of the use of the *P. coronata* palm, such as the manager of the Baturraden Botanical Garden and residents who worked as grass collectors in the area around the Baturraden Botanical Garden. Then, from these two groups of respondents, information was obtained about people who often use and know about the use of *P. coronata*, and so on until finally 37 respondents were collected. Sampling of *P. coronata* for making herbarium was carried out to help identify its morphological characters.

### Data analysis

The data obtained was analyzed descriptively and qualitatively, namely looking for facts with appropriate interpretation (Handayani, 2015; Ramli et al., 2019). In this case, describe things related to the use of the *P. coronata* palm, such as general benefits, parts used, and how to use it by the people around the Baturraden Botanical Gardens.

## Result and Discussion

### Respondent characteristics

There were 37 respondents interviewed, consisting of 29 men (78.34%) and 8 women (21.66%). Most respondents live in Banyumas Regency (75%), such as Kemutug Lor Village, Baturraden District, North Purwokerto District, Sokaraja District, Tambak District, and Somagede District. The remainder (25%) are respondents who live outside Banyumas Regency but come from Banyumas Regency, such as Banjarnegara, Bekasi, Bogor, Depok, Jakarta, Purbalingga, and Tangerang. The population around the Baturraden Botanical Garden is 100% Javanese. In general, many people around the Baturraden Botanical Gardens and Banyumas Regency are of productive age, so most of the respondents in this study were aged between 17-40 years (56.3%); the rest were aged 41-65 years (37.5%) and others (6.2%) (Figure 2).

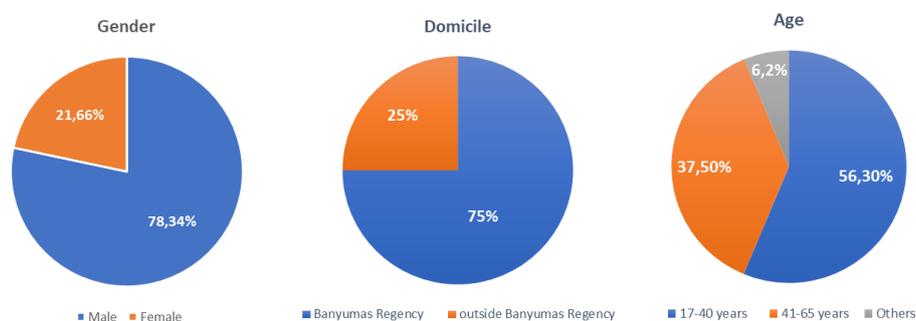


Figure 2. Respondent characteristics

### Palm *P. coronata* in and around the Baturraden Botanical Garden

The *P. coronata* palm is known by the people around the Baturraden Botanical Garden as Piji. In the area and around the Baturraden Botanical Garden, you can still find wild growth, such as in the valleys, cliffs on the western border of the area, and the climbing route to Mount Slamet, which passes through the Baturraden Botanical Garden (Figure 3). *P. coronata* is planted by the people around the Baturraden Botanical Garden to be used as an ornamental plant. The results of the discovery of *P. coronata* in this area are the results of research by Zulkarnaen et al. (2022), which states that *P. coronata* is one of 11 species of palm that are often found on the southern slopes of Mount Slamet, precisely in the

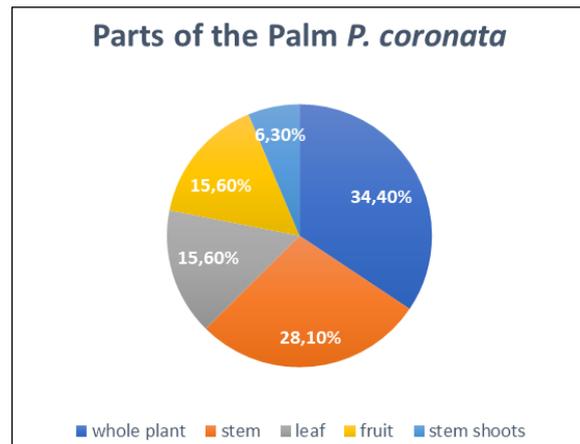
Baturraden area, Banyumas Regency, and is one of the dominant palms with high abundance, namely as many as 435 individuals starting from the sapling level, from young plants to mature plants.



**Figure 3.** *Pinanga coronata* grows wild around the Baturraden Botanical Garden Area (yellow arrow): A) the valley area within the botanical garden area; B) the cliffs on the western border of the botanical garden area; and C) the Mount Slamet climbing route in plot 3 of the botanical garden.

#### Utilization of the Palm *P. coronata*

Based on data obtained from interviews with 37 respondents, 22 people, or 59.45%, knew about the *P. coronata* palm and its uses. According to the respondents, the parts used can be grouped into whole plants, stem parts, leaf parts, fruit parts, and shoot parts. The percentage of the part most frequently used is the whole plant, i.e. 34.4%, while the rate of the part that is rarely used is the stem shoot, i.e. 6.3% (Figure 4). Whole plants are the most widely used because they have many benefits and are easy to use, such as ornamental plants, directional plants, and decorations, absorb pollutants, and improve air quality. Meanwhile, stem shoots are rarely used because if eaten raw, they taste sweet and a bit astringent, so to use them, they need to be processed first, such as making them into vegetables with spices and coconut cream added. Apart from around Baturraden Botanical Garden, the *P. coronata* palm is also used by the people of West Java, such as in the area around the Gunung Gede Pangrango National Park (TNGGP). Residents around TNGGP use the *P. coronata* palm as an ornamental plant (Purnawan, 2006), and its stem shoots for food (Alandana et al., 2015).



**Figure 4.** Percentage of parts of the *P. coronata* plant used by the people around the Baturraden Botanical Garden

Based on the research results, the use of *P. coronata* by the people around Baturraden Botanical Garden can be grouped into eight (eight) aspects: use in traditional medicine, ornamental/decorative plants, environmental role, building materials, wild animal/livestock food, food/food ingredients, rituals, and crafts hands/tools/toys. The parts of the plant that are most widely used by the people around the Baturraden Botanical Garden are the leaves (6 aspects of benefits), the fruit (3 aspects of benefits), then the whole plant, stems, and stem shoots, namely 2 aspects of benefits (Table 1 and Figure 5).

**Table 1.** Use of *P. coronata* by the people around the Baturraden Botanical Garden

Aspects	Parts of Plant					Utilization
	WP	S	L	F	SS	
Traditional medicine				√	√	<b>Fruit:</b> As a dental medicine/to clean teeth and scabies (by chewing or rubbing on the teeth) <b>Stem shoots:</b> As medicine for broken bones and back pain (eat it straight away).
Ornamental/decorative plants	√		√			<b>Whole plant:</b> Ornamental plants, directional plants, and decoration <b>Leaf:</b> Decoration
Environmental roles	√	√	√			<b>Whole plant:</b> Absorbs pollutants and improve air quality <b>Stem:</b> Firewood and media for growing orchids or epiphytic plants <b>Leaf:</b> Soil surface cover of agricultural land
Building material		√	√			<b>Stem:</b> House/hut poles in rice field areas; roof reinforcement in interior areas; and house fence

Aspects	Parts of Plant					Utilization
	WP	S	L	F	SS	
						<b>Leaf:</b> Roof of the house/hut and sitting mat in the hut in the forest area
Wildlife/livestock feed			√	√		<b>Leaf:</b> Goat feed <b>Fruit:</b> Natural food for squirrels
Food/food ingredients					√	<b>Stem shoots):</b> Food ingredients (cooked into curry, stir-fry, and pickles); direct consumption (fresh vegetables and food reserves when in the forest)
Ritual/culture			√			<b>Leaf:</b> Ritual (Palm Sunday commemoration) for Catholics <b>Fruit:</b> Substitute areca nut for <i>nginang</i> (betel nut).
Crafts/tools/toys			√	√		<b>Stem:</b> Grass cover <b>Leaf:</b> Grass binder; Traditional umbrella; Woven craft materials; Basic ingredients for traditional food containers <b>Fruit:</b> Tulup toy (children's toy like a bullet)

Description: WP: Whole Plant, S: Stem, L: Leaves, F: Fruit, SS: Stem shoot

Based on this description, *P. coronata* is still often used by the people around Baturraden Botanical Garden to support daily life. *P. coronata* is used as a traditional medicine to clean teeth because the fruit is thought to have chemical contents similar to *Areca cathecu*. According to Rambey et al., (2021) the people of Torgamba District, South Labuhanbatu, North Sumatra use areca nut (*A. cathecu*) as a strong medicine by making juice or eating it directly and using the “nyirih” culture. Hamidah et al. (2022) reported that the Dayak Bakumpai Bantuil Tribe of Barito Kuala Regency uses *A. cathecu* for “nyirih,” wound medicine, and itching medicine. Burkill (1935) also stated that the fruit of the forest areca nut (*P. coronata*) is used for “nyirih”, and the top of the stem (*umbut*) is eaten by the Jakuns and Bermun tribes (indigenous tribes of the Malacca Peninsula in Malaysia), while the Jakun tribe eats the roots as a contraceptive. The research results of Fauzi et al. (2022) reported that *A. cathecu* is widely used in aphrodisiac ingredients that can provide health benefits for male erectile dysfunction. According to Balick et al. (1990), genus *Pinanga* clan contains chemical compositions that are generally used as medicinal ingredients; apart from that, they are also used in rituals and to make handicrafts.

The stems and leaves of *P. coronata* are widely used by the people around the Baturraden Botanical Garden as building materials and handicrafts because they are quite weather-resistant. The leaves of *P. coronata* have an arrangement similar to coconut (*Cocos nucifera*) and areca nut (*A. cathecu*) leaves, so they are easy to weave and make into traditional handicrafts. According to Elsamanoudy et al.,

(2024), for thousands of years, since pre-industrial times, indigenous peoples in Mexico, Egypt, the UAE (United Arab Emirates), and India have used palm leaves, especially *C. nucifera* and *A. cathecu*, to support daily life. days, such as to make interior accessories, baskets, mats, weaving, coasters, fans, and decorative items.

Based on research, people around the Baturraden Botanical Garden consume *umbut* (stem shoots) of *P. coronata* because they have a texture and taste similar to coconut shoots (*C. nucifera*). Usually they eat it directly or process it into lodeh vegetables. Research by Rambey et al. (2021) explains that young stems of *C. nucifera* are used as vegetables when there are local celebrations in Torgamba District, South Labuhanbatu, North Sumatra, and Sulistia et al., (2021) explain that *C. nucifera* stems are still young (stem pith) is processed into a mandatory dish during the *begawe* tradition by the people of Narmada District, West Lombok Regency.

The *P. coronata* palm has an attractive stature and leaves, so it has high potential and economic value in the ornamental plant industry. This can be seen from several locations inside and outside the Baturraden Botanical Garden area, where *P. coronata* palms are planted as home garden plants and directional plants. *P. coronata* has a clumpy appearance like the ornamental palms *Cyrtostachys racca* and *Dypsis lutescens*. At the same time, its leaves are similar to the red areca palm (*A. vestiaria*) and the princess palm (*Veitchia merilli*). According to Broschat & Elliott (2014), ornamental palms are important to tropical, subtropical, and even warm climate landscapes. In cooler climates, it is an important interior landscape plant and is often a focal point in malls, businesses, and other public areas. Several species of palms that are commonly used as ornamental plants in several areas include *C. racca*, cabbage palm (*Licuala grandis*), king palm (*Roystonea regia*), princess palm (*V. merilli*), sadeng palm (*Saribus rotundifolius*), and yellow palm (*D. lutescens*) in West Lombok Regency (Sulistia et al., 2021), *Trachycarpus fortuneii* in Torgamba District, South Labuhanbatu, North Sumatra (Rambey et al., 2021), *Chrysalidocarpus lutescens* and *V. merilli* in the Tourism Area and the Sacred Place at Sumenep, Madura (Putri & Bashri, 2019), *Hyophorbe lagenicaulis*, *C. lakka*, *Roystonea regia*, *V. merillii*, *D. lutescens*, *Rhapis excels*, and *A. vestiaria* by the Pejambon Village Community, Negeri Katon District, Pesawaran Regency (Rodiyah, 2021), *C. renda*, *D. lutescens*, and *H. lageincaulis* by the people of Soya Village, Ambon City (Teusiit et al., 2024).



**Figure 5.** Utilization of *P. coronata*: A) ornamental/decorative plants, B) building materials (huts in the forest area at the foot of Mount Slamet), C) woven leaves as seating, D) animal feed, E) stem shoots eaten directly, F) stems as grass supports, G) orchid/epiphytic growing medium, H) firewood, I) grass binding, J) stems used as benches, and K) stems as poles and temporary building frames.

### Conservation of the *P. coronata* in Baturraden Botanical Garden

Based on research results, it is known that *P. coronata* is a multifunctional palm, so its use must be done wisely so that the continuity of supplies in nature is maintained. Thus, conservation of *P. coronata* must be carried out by integrating in-situ and ex-situ conservation. Referring to the "Makoyana" BRIN online database, one of the botanical gardens that has carried out both efforts to conserve *P. coronata* is Baturraden Botanical Garden (Pusdatin BRIN, 2021). The total

collection of *P. coronata* in the Baturraden Botanical Garden is 10 specimens, which came from Karang Sari RPH, Moga BKPH, West Pekalongan KPH, Jurang Mangu Village, Pulosari District, Pemalang Regency, and Mount Slamet Protected Forest, Baturraden (Registrasi Koleksi Kebun Raya Baturraden, 2024; ). According to Witono (1998) & Zulkarnaen et al. (2021), the palm collection of Baturraden Botanical Garden has a relatively small number of specimens when compared to the Bogor Botanical Gardens, which has 1,215 specimens. This happens because of the difference in the age of the botanical gardens. The Baturraden Botanical Gardens are now only 9 years old since they were inaugurated in 2015. The *P. coronata* collection at Baturraden Botanical Garden can be seen in Table 2 and Figure 6. Apart from those collected ex-situ, *P. coronata* also grows spontaneously (in situ) in the Baturraden Botanical Garden area, especially in valleys close to water flows and under stands of resin trees adjacent to *P. javana* (Figure 7).

**Table 2.** *P. coronata* collection at Baturraden Botanical Garden as of April 2024 (Registration Collection of Baturraden Botanical Garden, 2024)

Collector	Scientific Name	Local Name	Vak & No. Garden	Number of specimens	Origin of collection
IP00640	<i>Pinanga coronata</i> (Blume) Blume	Piji	I.C.192.	1	Karang Sari RPH, Moga BKPH, West Pekalongan KPH, Ds. Mangu Gorge, District. Pulosari, Kab. Pemalang, Central Java
AD00011	<i>Pinanga coronata</i> (Blume) Blume	Piji	V.A.78-78a-78b	3	Protected Forest, Mount Slamet, Baturraden, Central Java
AD00011	<i>Pinanga coronata</i> (Blume) Blume	Piji	XIII.A.3.	1	Protected Forest, Mount Slamet, Baturraden, Central Java
AD00011	<i>Pinanga coronata</i> (Blume) Blume	Piji	XIII.A.I.17-17a-17b-17c.	4	Protected Forest, Mount Slamet, Baturraden, Central Java
AD00011	<i>Pinanga coronata</i> (Blume) Blume	Piji	XIII.B.2.	1	Protected Forest, Mount Slamet, Baturraden, Central Java



**Figure 6.** Location of planting of the *Pinanga coronata* collection in Baturraden Botanical Garden, which functions as a directional plant: A) main road to the management office; B), C), and D) main road entering the botanical garden area.



**Figure 7.** *Pinanga coronata* growing spontaneously in the Baturraden Botanical Garden Area (yellow arrow): A) and B) valleys near water flows, and C) under stands of resin

## Conclusion

Based on the results of this research, knowledge was obtained regarding the use of *P. coronata* by the people around the Baturraden Botanical Garden in daily life. The use of *P. coronata* is divided into eight (eight) aspects, including 1) as a traditional medicine (fruit parts and shoots), 2) ornamental/decorative plants (whole plants and leaves), 3) environmental roles (whole plants, stems, and leaves), 4) building materials (stems and leaves), 5) wild animal/livestock food (leaves and fruit), 6) food/food ingredients (*umbut*/stem shoots), 7) ritual/culture (leaves and fruit), and 8) handicrafts/tools/toys (stems, leaves and fruit). Three parts of the *P. coronata* plant have great economic potential. First, whole plants used as ornamental/decorative plants have high economic value. Second, the leaves have the potential to be used as woven crafts. Third, the shoots are used as traditional medicine and food. Further study of the chemical composition contained in the shoots needs to be carried out so that they can be utilized more optimally.

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### **Conflict of Interest**

The authors declare that there is no conflict of interest in this research. All three authors contributed equally to the research and writing process and are therefore considered co-lead authors of this paper. The first author contributed to acquiring data on the use of *P. coronata* in the area around the Baturraden Botanical Gardens. The second author contributed to acquiring data on the general use of *P. coronata* in Indonesia. The third author contributed to acquiring ex-situ conservation data for *P. coronata* at the Baturraden Botanical Garden. The three authors contributed equally in formulating the research topic, research methods, conclusions, and the writing and revision process. Artificial Intelligence (AI) is of limited use for English language correction using Grammarly.

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