

# Species diversity and utilization of bamboo to support life's the community of Karangwangi Village, Cidaun Sub-District of Cianjur, Indonesia

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**Abstract.** Setiawati T, Mutaqin AZ, Irawan B, An'amillah A, Iskandar J. 2017. *Species diversity and utilization of bamboo to support life's the community of Karangwangi Village, Cidaun Sub-District of Cianjur, Indonesia. Biodiversitas 18: 58-64.* Bamboo is closely related to the lives of Indonesian people, especially in the rural area. Indonesia has a high diversity of bamboo species with multiple social, economic, cultural and ecological functions. Village communities have taken advantage of bamboo as a building material, furniture, handicrafts, household items, food, and medicine. The objective of this research is to determine the diversity of bamboo species in the Karangwangi Village and their role in supporting the daily life of the local community. The method used in this research is qualitative descriptive analysis method using ethnobotanical approach. Data collection was conducted with a semi-structured interview with local informants, followed by field observation and specimen collection. Bamboo specimens are later morphologically observed and identified. Results of the study shows that there are 13 species of bamboo in Karangwangi Village, namely *Haur Gereng* (*Bambusa blumeana* J.A & J.H. Schult), *Haur Geulis* (*Bambusa* sp.), *Haur Koneng* (*Bambusa vulgaris* var. *Striata*), *Haur Seah* (*Bambusa vulgaris* Schrad Ex. var *vittata*), *Awi Tali* (*Gigantochloa apus*), *Awi Hideung* (*Gigantochloa atrovioleacea* Widjaja), *Awi gombong/Awi Surat* (*Gigantochloa pseudoarundinacea* (Steud.) Widjaja), *Awi Temen* (*Gigantochloa atter* (Hassk.) Kurz.), *Awi Lengka* (*Gigantochloa hasskarliana* (Kurz.) Backer ex Heyne), *Awi tamiyang* (*Schizostachyum iraten* Steud.), *Awi Gembong* (*Schizostachyum* sp.), *Awi Hias* (*Bambusa glaucophylla* Widjaja), and *Cangkoreh* (*Dinorchloa scandens* (Blume ex Neese) Kuntze). These species are used by the community of Karangwangi Village for various purposes, ranging from building materials, handicrafts, furniture, food, medicine, to fish poison.

**Keywords:** Bamboo, Cianjur, diversity, Karangwangi, utilization

## INTRODUCTION

Bamboo is woody perennial grass. It is an important multi-purpose plant that grows rapidly and produces a high amount of biomass. Bamboo has more than 1,250 species that vary in structure and form and occur under widely varying ecological conditions in the tropics and subtropics or more temperate regions. This plant has multiple uses, such as its use in building, for pulp and paper manufacture, cottage industries, and household use (Banik 1995). Bamboo as a wood substitute material has an advantage, that is as fast-growing plant, it can be harvested at the age of 4 years (have a short cutting rotation). This means that for a certain time unit, bamboo has a high level of productivity (Nuryatin 2012).

Bamboo is a non-timber forest product that has been known to be very close to people's lives, especially in the rural communities. The diversity of bamboo species in the world is around 1250 - 1500 species, while Indonesia only has about 10 % or 154 species of bamboo (Batubara 2002). The data shows that bamboo is a very abundant resource and has high diversity. However, not all bamboo species is well known and has been utilized optimally (Nuryatin 2012).

Bamboo very closely related to people's lives, especially in the rural communities. People make household items and livings from this species. The very culture of these communities cannot be separated from bamboo. This put bamboo in the category of Multipurpose Free Species. Bamboo has been used widely for various purposes, from as building materials, home furnishings, handicrafts, foodstuffs, to medicines (Patel 2005; Tamang et al. 2013; Honfo et al. 2015). In addition, bamboo has ecological functions and the potential to be the solution of environmental problems such as global warming (Thokchom and Yadava 2015) as well as social economic values (Kelbessa et al. 2000; Lobovikov et al. 2007; Pande et al. 2012). According to Widjaja (2004), the fast growth rate of bamboo makes it ideal as reforestation plant. Furthermore, bamboo produces the highest amount of oxygen among other trees. Its ability to absorb carbon is also high enough to overcome the problem of CO<sub>2</sub> concentration in the air. Additionally, bamboo serves as water purifier that can be used in the remediation of critical soil (Liang 1983; Batubara 2002; Zhou et al. 2005; Mishra et al. 2014).

Karangwangi Village is located in Cidaun District of Cianjur Regency, West Java. Based on the classification by

Schmidt and Ferguson (1951), the village belongs to the type B with the average rainfall of 1840 mm/year. Type of vegetation in a climate of type B (wet) is a tropical rainforest. The village's topography ranges from 0 to 250 meters above sea level (masl). Karangwangi Village is directly adjacent to the Bojonglarang Jayanti Natural Reserve Area. The existence of this natural reserve affects the diversity of flora and fauna in Karangwangi Village, including bamboo. Bamboo plays important roles in supporting the lives of Karangwangi Village community. Thus, the study of bamboo diversity and utilization in the village becomes important.

## MATERIALS AND METHODS

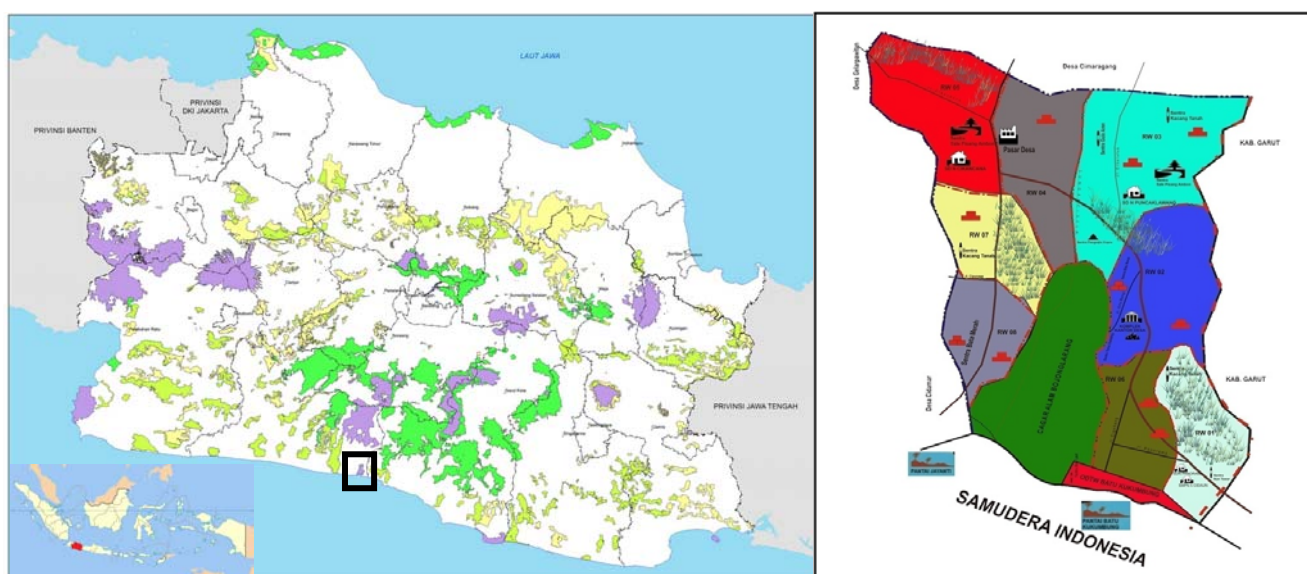
The method used in this research is qualitative approach with descriptive analysis and based on ethnobotanical approach (Martin 1995; Cunningham 2001; Newing et al 2011). Data collection was conducted with a semi-structured interview with informants, followed by field observation and specimen collection. Key informants were selected as many as 10 people by purposive technique consisting of one person head of the village, 3 bamboo plantation owners, 3 bamboo craftsmen and 3 sellers of bamboo. Specimens of every bamboo species found in Karangwangi village were observed and identified by their morphological characteristics (i.e. the characteristics of the culm, leaves, and buds). Identification process refers to the identification book of bamboo species (Widjaja 2001, Arinasa and Peneng 2013). The result of the interview was analyzed by cross-checking, summarizing and synthesizing from sources in order to build up a narrative account (cf. Newing et al 2011). The location of research can be seen in Figure 1.

## RESULTS AND DISCUSSION

Based on interview and field observation, 14 species of bamboo were found in Karangwangi Village. According to the local community, there are two kinds of bamboo based on their cultivation technique: self-growing bamboo (*jadi sorangan*) and planted or cultivated bamboo (*dipelak*). Self-growing bamboo grows by itself without the intervention of a human. This type of bamboo includes *Haur Gereng*, *Haur Geulis*, *Haur Koneng*, *Haur Seah*, and *Awi lengka*. Cultivated bamboo includes *Awi Hideung*, *Awi Tali*, *Awi gombong/Awi Surat*, *Awi Temen*, *Awi tamiyang*, *Awi Gembong*, and *Awi Hias*.

People of Karangwangi Village classify bamboo into two names: *Haur* and *Awi*. *Haur* is the bamboo that grows wild in the forest and grows by itself on communities land. It has the characteristics of small culm and cavity, as well as thick flesh. Meanwhile, *Awi* is the bamboo that is planted on people's land or that grows by itself either in fields or forests. *Awi* has a large cavity and a variety of flesh thickness based on the species of the *Awi*.

Bamboo plays important roles in supporting the needs of the people in Karangwangi Village. This is shown in its utilization in various aspects of the community's daily life. For example, the use of bamboo as house foundation. Bamboo is used because it is cheaper and stronger than other woods. In addition, bamboo is also used to make household appliances and other tools that assist and facilitate people's livelihood. The Karangwangi village community's knowledge about bamboo is obtained through their ancestors (parental learning or vertical cultural transmission) (Puri 1997). This community can distinguish bamboo species from one another by its cultivation, color, culm size, and utilization. Examples of each categorization are as follows: by color: *Awi Hideung* (black bamboo) and



**Figure 1.** Research location in Karangwangi Village, Cidaun Sub-District, Cianjur District, West Java, Indonesia

*haur kuning* (yellow bamboo); by cultivation: wild or self-growing (bamboo included in the group of *haur*) and planted or cultivated (bamboo included in the group of *awi*); by culm size (*Awi gombong* has large culm, while *Awi tamiyang* has small culm); by utilization: *Awi gombong* has strong culm, so it is often used as the foundation of the house.

Thus, unlike biological classification, traditional classification of bamboo by Karangwangi Village community (folk classification) is based on the cultivation, morphology, and utilization of the bamboo species (cf. Brush 1992; Iskandar and Ellen 1999). These are some bamboo species in Karangwangi Village based on the knowledge of the local community:

#### **Haur Gereng (*Bambusa blumeana* J.A & J.H. Schult)**

This bamboo is known as *Haur Gereng* or *Awi duri* (Sundanese) by the community in Karangwangi Village because there are spines (*duri*) on the ramifications (Figure 2.A). The local community rarely uses this species due to the presence of spines on the bottom part of the culms. So, people use a *taraje* (ladder) to cut down the higher part of the culm where there are no spines. Besides, this plant is only found in the nature reservation site which is protected by the government, thus limiting people's access to it. *Haur Gereng* is commonly used by people in Karangwangi Village to make *palupuh*, a kind of long chair made by splitting the bamboo into two parts: the outside of the bamboo, which is arranged on top the *Palupuh*, and the inside of the bamboo at the bottom. Moreover, young buds (*rebung*) of *Haur Gereng* is commonly used as fish poison.

Furthermore, according to Schroder (2011), this bamboo's culm is often used as construction materials, parquets, baskets, furnitures, concrete buttresses, kitchen utensils, handicrafts, chopsticks, hats, and toys. *Bambusa blumeana* also serves as raw material for paper pulp and as firewood substitute. The young shoots of this plant can be eaten as vegetable. This bamboo species also has great potential for the rehabilitation of marginal land and can be used as living fence and windbreaker on the border of agricultural areas, or as erosion preventer along the river. This Bamboo also produces a melodious sound, so it is often used as a material for making *tingklik*, a traditional music instrument from Bali (Arinasa and Peneng 2013).

#### **Haur Geulis (*Bambusa* sp.)**

*Bambusa* sp. has shiny green stem with very smooth surface texture, so people call it *Haur Geulis* (*beautiful bamboo*) (Figure 2.B). *Haur Geulis* is an ornamental plant and erosion preventer. Additionally, this plant is also used as a construction material because its culm is the sturdiest among other species of bamboo and is resistant to termites. Li (2004) states that bamboo culm's resistance to parasites, such as fungi and borer insects, is determined by its chemical composition. One of that composition is starch. Starch contained in bamboo is a nutrient for mold growth and borer insects. Bamboo with high starch content has lower resistance against invading organisms (Liese 2003). The sturdiness of bamboo culm is also determined its composition of chemical compounds, one of them is the

rigid lignin. Bamboo consists of about 50-70 % holocellulose, 30% pentose, and 20-25 % lignin (Liese, 1992). In some species, phenolic extract of this plant provide resistance to decay and insect attack (Liese 2006).

#### **Haur Koneng (*Bambusa vulgaris* Schrad ex. var. *striata*)**

*Haur Koneng* has sturdy, thick culm. The culm is yellow in color with green stripes on each culm segment (internode) (Figure 2.C). Thus, this plant is called *Haur Koneng* (yellow bamboo). The community of Karangwangi Village uses *Haur Koneng* only as an ornamental plant. But according to the local myths, *Haur Koneng* is used to protect people from the power of black magic (*tolak bala*).

In Bali, varieties of yellow culm are preferred than varieties of green culm and are used as furniture material. But outside of Bali, the green culm varieties are preferred by craftsmen. Green culm varieties are also used to make cabinets and racks (Arinasa and Peneng 2013). According to Wulandari et al. (2013), bamboo buds of *B. vulgaris* var. *Striata* is widely used by people to treat cancer.

#### **Haur Seah (*Bambusa vulgaris* Schrad ex. var. *vulgaris*)**

This bamboo species similar to *Haur Geulis*, but has thinner flesh (Figure 2.D). However, people do not utilize this plant because it only grows in the forest of Karangwangi natural reserve site. This is related to the legal protection of all kinds of organisms in the forest of nature reserve. *Haur Seah* has light-green culm that grows upright. Its can reach 16 meters in height or more, depending on the fertility of the soil. It grows well in riverside land or waterlogged soil (Ekawati et al. 2013).

#### **Awi Tali (*Gigantochloa apus* J.A & J.H Schult. Kurz.)**

This species is called *Awi Tali* because of its use as rope for binding. *Awi Tali* has bright green color (Figure 2.E). The culm has flexible structure, has a long fiber and very good for binding. This kind of bamboo at the age of one to two years is very good to be used as a material for binding because the texture of the fiber and the flesh is still wet, flexible and not hardened. According to Arinasa and Peneng (2013), *Awi Tali* has several advantages compared to other bamboo, namely flexibility and durability. Flexible nature of *Awi Tali* makes crafters easily form a wide range of household products industry.

This plant's roots is used to cure diabetes, ulcer, liver, hypertension, kidney, breast cancer, spleen, blood cancer, and cough. While culm of *Awi Tali* can be used to rejuvenate the skin scars, induce childbirth, and to treat wounds (Sujarwo et al. 2010).

#### **Awi Hideung (*Gigantochloa atrovioacea* Widjadjaja)**

*Awi Hideung* is a species of bamboo that has a green culm when young and predominantly black and a greenish hue when already mature (ready for harvest) (Figure 2.F). According to the local community, *Awi Hideung* has similarities with *Awi Wulung* are both have black culms, but there are differences with *Awi Hideung*. *Awi Wulung*, when young have a black stem and remain black until

adulthood, so many people who think that *Awi Wulung* and *Awi Hideung* is the same.

*Awi Hideung* commonly used to make furnitures such as tables and chairs, as well as to give a touch of art to the webbing of *bilik* called *matawali*, while *Awi Wulung* used to make musical instruments such as the *angklung*. As reported by the Widjaja (2001) that *Awi Hideung* widely used for furniture industrial, *bilik*, crafts, and traditional musical instruments. According to Nuryatin (2000), *Bambu Hitam* is the main component of *angklung* because it produces the most appropriate tone.

Results of testing on the quality of the voice declares that *G. atroviolacea* (black bamboo) has the best sound quality because it has height enough mass density and vascular bundles in the stem spread evenly (Nuryatin 2001). Yani (2012) mentions that *Awi Hideung* is often used for the manufacture of bamboo furniture because it has black colour and shiny, more beautiful and gives the impression of an exotic and luxurious on these items.

#### **Awi gombong/Awi Surat (*Gigantochloa pseudoarundinacea* (Steud.) Widjadja)**

*Awi gombong* has a characteristic green color with lots of yellow color line scratch (Figure 2.G). When dry, the green color of this bamboo becomes fade and change color to yellow. According to local community, the different mention of *Awi gombong* or *Awi Surat* depending on location. *Awi gombong* has a larger culm than the other bamboos, a large cavity diameter with thick and strong walls. Because *Awi gombong* has strong culm, so it is often used as the primary choice for the foundation of the house. According to Wulandari et al. (2013), bamboo is used for building materials, plumbing and traditional musical instruments also can be used as raw material for chopsticks. Buds of *Awi gombong* can be cooked as a vegetable.

#### **Awi Temen (*Gigantochloa atter* (Hassk.) Kurz.)**

*Awi Temen* or *Awi Hejo* has a characteristic of the slightly-yellowish green culm (Figure 2.H). On each internode there are sheaths (*salumpitan*) covering the segments of culm neatly. The feature of this bamboo is straight culm with size of culm almost the same and shiny yellow culm when dry. *Awi Temen* is widely used as raw material in chopsticks industry because it is more easily processed by machines than other types of bamboo (Arinasa and Peneng 2013). According to Wulandari et al. (2013), this bamboo can be used as pillars in a bamboo house and to make musical instruments such as *calung*.

#### **Awi Lengka (*Gigantochloa hasskarliana* (Kurz.) Backer ex Heyne)**

This bamboo species is also known as *bambu sorik* or *Awi Lengka* (Sunda). *Awi Lengka* grows by itself in the wild and is found mainly on cliffs, slopes, or riverside. *Awi Lengka* has small culm size and green color (Figure 2.I).

In West Kalimantan, *G. hasskarliana* is broadly planted on steep hills to prevent soil erosion, whereas in East Kalimantan it is used to make baskets. Generally, local communities use this bamboo as fence (Drensfield and

Widjadja 1995). The research of Sujarwo et al. (2010) states that *G. hasskarliana* is considered sacred by the community around *Puncak Lampu Hyang Luhur*, Abang subdistrict, Karangasem, and is believed to cure breast cancer, insomnia, and heart palpitation.

#### **Awi tamiyang (*Schizostachyum iraten* Steud.)**

*Awi tamiyang* is similar to *Awi Lengka* and *Awi Gembong* (Figure 2.J). Ancient people often use this awi as *sumpit*, a tool for hunting birds. But, around the 70s, rifles and guns for hunting are introduced in this village, stopping the use of *sumpit*. *Awi tamiyang* is known to the people as the bamboo that is most often attacked by pests, and is never used as building materials in consequence. According to Widjadja (2001) the culm of *Awi tamiyang* is widely used to make flutes.

#### **Awi Gembong (*Schizostachyum* sp.)**

*Awi Gembong* is a species of bamboo that is only found in the forest and never used by the community. The culm flesh is very thin, consequently making it unsuitable as a building material (Figure 2.K). According to the local community, *Awi Gembong* is close in characteristics to *Awi tamiyang*. This is supported by Widjadja (2001) who stated that the identity of this bamboo still needs further study because of its similarities with *Schizostachyum iraten* (*Awi tamiyang*).

#### **Awi Hias (*Bambusa glaucophylla* Widjadja)**

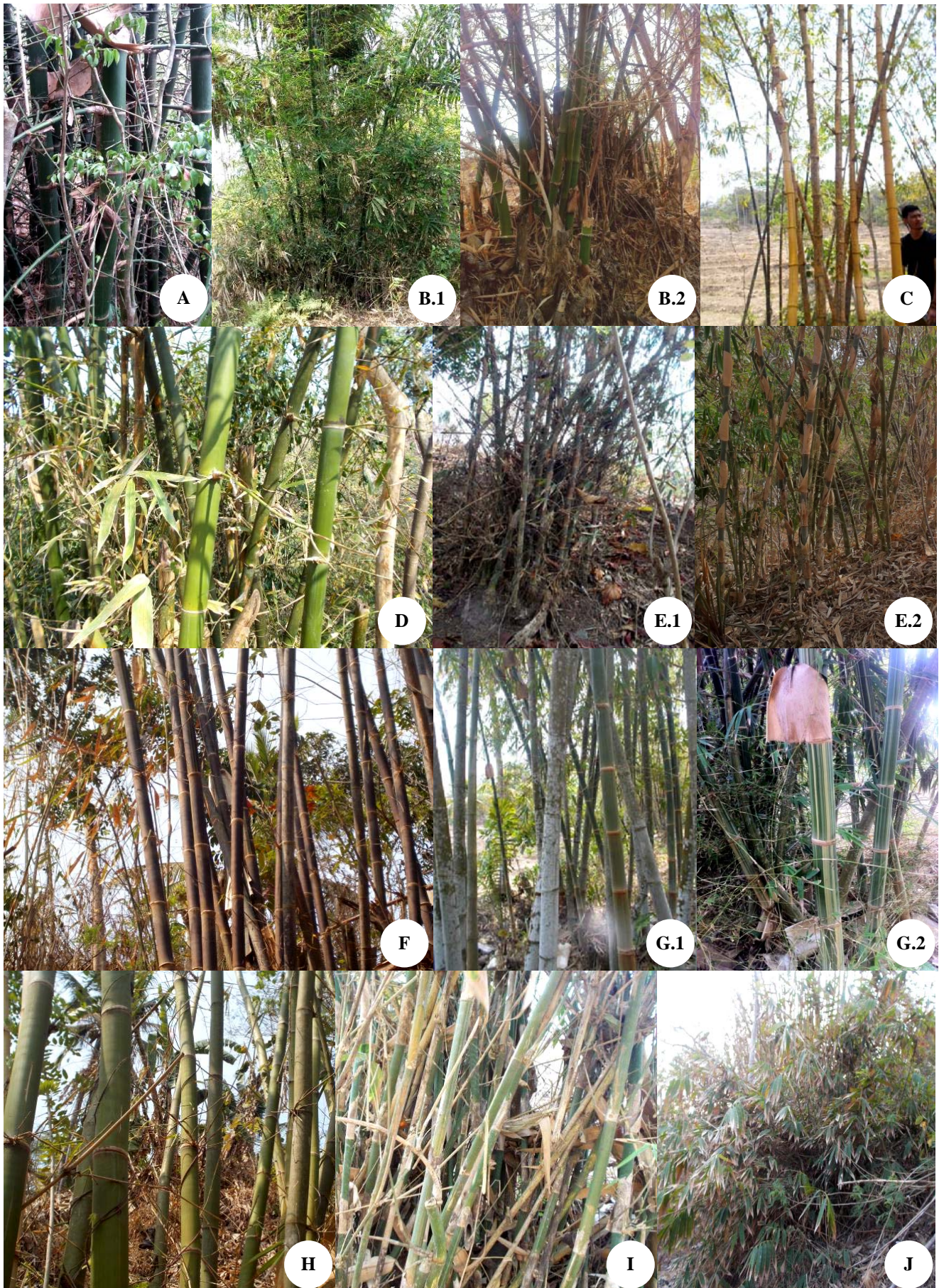
This species commonly grows in yards. Its white-striped leaves are the particular characteristics of this species (Figure 2.L). It reaches 5 meters in height (Widjadja 2001). The existence of this ornamental bamboo was relatively recent. This bamboo species was introduced around the year 2000. People utilize this bamboo as decoration plant in the front of their houses. The unique shape and appearance of *Awi Hias* make people in Karangwangi Village plant it in their yards.

#### **Cangkoreh (*Dinorchloa scandens* (Blume ex Neese) Kuntze)**

This species of bamboo is only found in the forests. *Cangkoreh* has the characteristic of growing vines (Figure 2.M). According to Solikin (2003), this type of culm growth, which is lying or climbing, is a characteristic of *Dinorchloa scandens* that is not present in other genus. Water from the culm of this plant is traditionally used as eye drops and cough medicine.

This study concluded that the Karangwangi Village community has rich local knowledge on bamboo species. The bamboo species can be traditionally classified based on cultivation and wild growing, 'color', 'shape of culm', 'leaves', 'branches', and 'utilization of bamboo'. Undoubtedly bamboo plays important roles in fulfilling household needs of the people in Karangwangi Village. More intensive research on the local knowledge and ecology of bamboo species in Karangwangi Village is urgently needed.









**Figure 1.** Bamboo diversity of Karangwangi Village, Cidaun Sub-District of Cianjur, Indonesia. A. *Bambusa blumeana* J.A & J.H. Schult, B. *Bambusa* sp., C. *Bambusa vulgaris* Schrad ex. var. *striata*, D. *Bambusa vulgaris* Schrad ex. var. *vulgaris*, E. *Gigantochloa apus* J.A & J.H. Schult. Kurz., F. *Gigantochloa atrovioleacea* Widjadja, G. *Gigantochloa pseudoarundinacea* (Steud.) Widjadja, H. *Gigantochloa atter* (Hassk.) Kurz., I. *Gigantochloa hasskarliana* (Kurz.) Backer ex Heyne, J. *Schizostachyum iraten* Steud., K. *Schizostachyum* sp., L. *Bambusa glaucophylla* Widjadja, M. *Dinorchloa scandens* (Blume ex Neese) Kuntze

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