



Study on the Use of Plants in Balinese Ethnicity in Bengkulu as an Alternative Source of Learning Plant Taxonomy Based on Local Wisdom

Kasrina^(✉), Alif Yanuar Zukmadini, Yunidar, Anggun Diyan Nurhasanah, Hafiza Imam Haidayatullah, and Tri Irama Setiadi

Biology Education Study Program, University of Bengkulu, Bengkulu, Indonesia
kasrina@unib.ac.id

Abstract. This study aims to reveal the diversity of plants used by the Balinese Ethnic community in Pondok Kelapa District, North Bengkulu which can be developed as a source of learning based on local wisdom in the Higher Plant Taxonomy Course. The research was conducted in Pondok Kelapa District, North Bengkulu Regency using survey methods, plant observations, interviews on plant utilization in Balinese ethnic communities selected by purposive sampling and literature study. Descriptive data analysis. From the results of surveys, observations, interviews and identification to get the Latin name found 2 divisions of plants (Pteridophyta, Magnoliophyta), 56 families, 115 species of plants used for food, board, medicine, ornamental, ritual, spice, dye, protective, firewood, fences, animal feed Taxon A family with many species, successively Araceae (7 species) Arecaceae (5 species), Euphorbiaceae and Zingiberaceae (4 species). The most widely cultivated plants were Cordylene/andong, (80%) Bougainvillea (68%), Curcuma domestica (52%) Cocos nucifera, Musaenda (50%) Manihot/Cassava (42%). The number of plants found in the yard is related to their frequent use in rituals and food needs. Plants that are dominant in terms of taxonomy and presence in the yard can be developed as learning resources in the Plant Taxonomy course.

Keywords: Benefits of Plants · Balinese Ethnicity · Local Wisdom Learning Resources

1 Introduction

To meet the diverse needs of life, people have long used the plants around them, but knowledge of the use of these plants has not been widely documented, in the Batu Lanteh area of Sumbawa, West Nusa Tenggara, there were 111 types of useful plants for nine benefits such as food and clothing materials, medicines, fragrances, antidotes, devils, rigging, crafts, bee feed [1]. Meanwhile, in Bengkulu Province, documentation of plant utilization has been carried out in several areas, it was found that the number of species and the use of species varied between regions [2–5] ranging from 79–130 species and the benefits were mostly found in the Semende ethnic group in Tebing Rambutan Village,

District Nasal Kaur District for 14 types of benefits [6]. While in other areas, not much has been documented.

In the Semende ethnic group, Kaur district, there is a positive correlation between knowledge about plants and their use with a person's age. This knowledge implies that the younger generation has low knowledge about plants [6]. Deliberate efforts should be made to maintain botanical knowledge among young people, one of which is integrating learning with culture. According to Alexon [7] a learning approach that prioritizes culture in the process will allow students to show a strong interest in learning. Learning that prioritizes culture in the process is classified as creative and meaningful modern learning, this is because (1) culture-based learning makes learning meaningful contextually and related to the cultural community where students live and interact socially and (2) culture-based learning makes learning interesting and fun.

Local wisdom-based learning that puts forward this culture has an impact on learning. Research on the exploration of local wisdom in the use of plants can be used as a source of student learning [8]. Learning resources are everything that can be used to gain knowledge, experience, and skills so that learning outcomes can be achieved [9]. Exploring local potential as a source of culture-based learning is very supportive to be carried out in Bengkulu Province, because Bengkulu Province lives with various ethnicities, one of which is ethnic Balinese who live in Sunda Kelapa Village, Pondok Kelapa District, Central Bengkulu. Ethnic Balinese are generally well-known for their cultural wisdom that is very close to plants, while documentation of the use of plants in this area has not been explored. The results of research that have been carried out in this area explain that there is local ethnic Balinese wisdom, namely the obligation to maintain the residential environment and agricultural land, respecting natural products with religious ceremonies, utilizing plants in religious rituals that are held every week, the community kindly allows outsiders to participate in watching ritual events religious [10, 11]. This area with the characteristics of a typical Balinese ethnic village is already visible, because there are places of worship for Hindu "temples" located in every resident's house the owner, and the diversity of plants planted around it, but this information on the ethnobotany of the Balinese ethnic community has not been documented.

The results of research on the island of Bali, for ritual events found 78 species [12], medicinal plants 239 species [13]. The cultural wealth of the Balinese people regarding traditional medicine is contained in the Lontar Usada Bali in the form of manuscripts written on palm/siwalan leaves (*Borassus*) contains the treatment system, medicinal ingredients and traditional medicine methods. Lontar usada is also a reflection of how Hindus in Bali believe that illness is the will of Shang Hyang Widhi, as much as their belief that medicine cures various types of diseases [14].

Indonesia has a large area, so that research involving scientific and cultural studies is still rarely carried out and documented. Therefore, one of the efforts that can be done is to integrate it into education. This is in line with the national education system law (SISDIKNAS) which states that learning activities should have relevance to the culture and potential that exists around students. This is also in line with the foundation in the preparation of the Higher Education curriculum in the Industrial 4.0 era that it is necessary to understand local culture to protect oneself from the impact of globalization [15]. Then, in line with the revitalization of the Biology Education Curriculum with the

implementation of the Independent Learning-Independent Campus program launched by the Ministry of Education and Culture for Universities throughout Indonesia, the Undergraduate Biology Education Program FKIP UNIB developed a relevant curriculum for the program. The curriculum developed is referring to the development of education and learning oriented to local wisdom (ethnobiology) and the environment while still prioritizing the goals of 21st century education [16]. This study aims to determine the diversity of plants used by Balinese ethnic in Pondok Kelapa sub-district as a learning resource for Plant Taxonomy based on local wisdom of Balinese ethnic culture.

2 Method

The research was carried out in the Balinese Ethnic Community in Pondok Kelapa Village, North Bengkulu Regency using the method of observation and interviews with the selected people (50 families), collection and determination of plants. Sample for selected people was collected by purposive sampling, namely Balinese ethnic who had knowledge about the benefits of plants. Interviews were conducted to get information about the types of plants used for various purposes and the uses of medicinal plants in curing diseases [17, 18]. After the interviews were conducted, further observations and documentation of plant photos and collections of plants were carried out to then make a herbarium. To get Latin names, we used the determination reference book by matching the collection of plants in the field with the reference.

3 Result and Discussion

3.1 Diversity, Classification, and Characteristics of Plants Used by Balinese Ethnic in Sunda Kelapa

Research on the use of plants in Balinese ethnicity as a supplement to teaching materials for local-based Plant Taxonomy found 2 divisions of plants, namely Pteridophyta and Magnoliophyta, 56 families, and 115 species of plants used for various purposes. The uses of plants are as follows: for medicine (51 species), ornamental plants (43 species), food (29 species), rituals (28 species), spices (11 species), protective plants (6 species), and 2 to 3 species for boards, dyes, firewood, fences and fodder. The results of this study are in line even though the number of species is much different from that found in the Banyumas Regency, Central Java, [19] where the variations in use are as follows: for building wood and furniture (87 species), industrial materials (42), medicinal plants (120 species), ornamental plants (139) producing carbohydrates (17 species). The results of the study are also in line with those found on the island of Simeulue Nanggroe Aceh Darussalam, there are 200 species of plants that have been utilized by the community, medicinal plants have a high number of species used, namely 70 species [20].

Area and ethnicity of the 115 plant species that have been classified, 3 species were found from the Pteridophyta division, namely *Platyserium biforcatum* (deer antler fern) which belongs to the Polypodiaceae family, *Asplenium nidus* (Bird's nest fern) which belongs to the Aspleniaceae family, both of which function as ornamental plants and *Marsilea crenata* (clover) from the family Marsileaceae and serves as a medicinal plant.

According to Adjie [21], the Polypodiaceae family has 56 genera with approximately 1200 species, most of which are epiphytic plants, some are terrestrial, have monomorphic or dimorphic leaves, mostly simple to single pinnate and leaf veins are webbed. Sori round to oval sometimes elongated, acrosticoid, sometimes submerged, without indusium. Aspleniaceae has 2 genera (Asplenium, Hymenasplenium), 700 species, epiphytes, terrestrial, rheophytes. Simple leaves – pinnate, pinnate or forked veins are usually free. Sori like a line along the vein with the indusium. Marsileaceae consists of three genera (Marsilea, Pilularia, Regnellidium), characterized by aquatic plants, semi-aquatic, heterosphere, leaf blades split into two or four leaflets, young leaves curl.

Experts classify ferns in different ways, some experts classify ferns into 4 divisions, namely Psilophyta, Lycophyta, Sphenophyta and Pterophyta [22]. The classification system adopted by Tjitrosoepomo 1994 is grouped into one division, namely Pteridophyta and four classes, namely Psilophytinae, Lycopodiinae, Equisetina and Filicinae [23]. Schuettpelz further stated that there are two pteridophyte classes: Lycopodiopsida (lycophytes) and Polypodiopsida (ferns) [24]. The three types of ferns found were included in the Polypodiopsida class. From the results of the grouping of ferns, the Polypodiopsida class based on morphological characters and molecular evidence, plant taxonomist Judd etc. [25] grouped it into one group with seed plants (Spermatophyta) namely the Euphyllophyte group. This group has a distinctive character that has multiflagellated sperm. In another group, namely Lycophyte has biflagel sperm except in Isoetes and Phylloglossum. This is why ferns are now grouped into two major groups, namely Lycophyte and Euphyllophyte. Lycophyta includes wire nails and Euphyllophyte includes ancient ferns, horsetails and common ferns in the Tjitrosoepomo 1994 version of the classification system.

In the Magnoliophyta division, the taxon family with many species are Araceae (7 species) Arecaceae (5 species), Euphorbiaceae and Zingiberaceae (4 species). The most cultivated plants were *Cordylen fruticosal*carriage, (80%) *Bougainvillea glabra* (68%), *Curcuma domestical*turmeric (52%) *Cocos nuciferal*coconut, *Musaenda frondosa* (50%), *Manihot utilissima*Cassava (42%). The number of plants found in the yard is related to their frequent use in rituals and food needs. Plants that are dominant in terms of taxonomy and presence in the yard can be developed as learning resources in the Plant Taxonomy course. Some of the selected families can be described further. The large number of species was found to be related to the utilization by the Balinese. The two dominant families can be described as follows:

There are 7 species of Arecaceae family, this family is called as the Arum family with 104 genera or 3300 species of plants. The Araceae consist of terrestrial or aquatic shrubs, vines, or herbs (the vegetative body reduced and globose to thalloid in the Lemnoideae). The roots are often mycorrhizal, without root hairs. The stems are rhizomatous, cormose, tuberous, or reduced. The leaves are simple, bifacial, spiral, or distichous, sometimes highly divided or fenestrate (often exhibiting heteroblasty), with parallel, penni-parallel, or netted venation. The inflorescence is a terminal, many-flowered spadix (with a sterile apical portion in some), usually subtended by a prominent, often colored spathe. Members of the family have distributions in tropical and subtropical regions. Economic importance includes many taxa that are important food sources,

indigenous medicinal, fiber (from roots), or arrow-poison plants; and numerous cultivated ornamentals [26]. A key characteristic of the Araceae family is the inflorescence arranged in the form of a cob (spadix) surrounded by a spathe [27]. According to IPGRI, the shape of the surface sheath in Araceae is closed, tilted, flat, open. Research on the island of Bali on the Balinese community there are 21 species of Araceae, but not all of them are known to be used by the community, most of these species are used as ornamental plants, food and materials for religious ceremonies. There are several types of unknown potential. Differences in characters between species of the Araceae family can be seen in the color and shape of the tuber, the tip of the leaf blade, the edge of the leaf blade, the top and bottom surfaces of the blade drooping, curled, twisted, and twisted around [28].

Species of Araceae found in Balinese ethnicity in Sunda Kelapa Bengkulu are: *Aglaonema commutatum* (taro), *Monstera andosonii* (Janda Bolong), *Caladium tricolor* (taro tricolor), *Caladium bicolor* (taro freida temple), *Anthurium crystallinum* (soybean taro) *Caladium bicolor* var polka green (Polka green taro), *Scindapsus pictus* (green taro) *Alocasia plumbea* (black taro). All of these species are ornamental plants except *Alocasia plumbea* (black taro) which is used for animal feed. The number of species found was different from that found in Semarang, Central Java. Based on the study, 13 plant species were found from the Araceae family [29]. Furthermore, this shows that the differences in the types of plants found are influenced by differences in their habitats [30]. In Jekan Raya District, Palangkaraya City, 16 species were found. Aracea is an endangered and protected species leaf blade, leaf blade holder, and leaf blade shape [31].

Arecaceae, is the second family whose dominant species were found, namely 5 species: *Cocos nucifera*, *Areca catechu*, *Phoenix reclinata*, *Salacca edulis*, *Phoenix dactylifera*. The Arecaceae family is very easy to identify with woody characteristics, often large leaves, flowers small, regular, bi-or unisexual (usually monoecious), inn panicles, often subtended by a large spathaceous bract, one ovule in each locule; berry or drupe, seeds with endosperm [32]. Among these five types, the use of coconut/*Cocos nucifera* is mostly used by the Balinese in Pondok Kelapa, namely for medicine and rituals. Utilization of coconut in Denpasar and Badung [33], this plant is also used for medicine, rituals, buildings, household appliances. The part that is most widely used is the young fruit (bungkak) and the least amount of roots is for craft materials. Coconut is one of the important palm species in the tropics, both for local and commercial use. The distribution is very wide throughout the tropics to subtropics. It is a single house plant with a height of up to 40 m. The coconut trunk when it reaches a certain height slightly curves its growth, the surface is like a ring of fallen leaves [34].

The Euphorbiaceae family used by the Balinese in Pondok Kelapa are 5 species, namely *Euphorbia lactea*, *Manihot esculenta*, *Jatropha curcas*, *Aleurites moluccana*, *Euphorbia tirucali*. Euphorbiaceae, also known by the name of the distance, often called the gums, this family has the following characteristics: Habitus shrubs, trees, and herbs, the stems contain white sap, the bones of the leaves are compound (single), and generally have fruit box Prabowo [35] found 9 species belonging to the Euphorbiaceae family, namely: *Coidaeum variegatum*, *Bischofia javanica*, *Euphorbia pulcherrima*, *Jatropha*

curcas, *Holmanthus populneus*, *Ricinus comunnis*, *Mallotus panicilatus*, *Manihot esculenta*, *Euphorbia milli*. There are two similar types found in ethnic Balinese in Sunda Kelapa Bengkulu, namely *Manihot esculenta* and *Jatropha curcas*.

Manihot esculenta in Balinese ethnicity is used for medicine, vegetables and rituals. The frequency of attendance reaches 42%, this is related to the many uses. Almost all countries in Asia and Africa use casava as a source of carbohydrates as a substitute for rice [36] Casava has a high pharmacological value for obesity prevention, because it is low in fat and rich in fiber [37].

The next dominant family is Zingiberaceae, which has 5 species used by the community, namely *Zingiber officinale* (ginger), *Curcuma domestica* (turmeric), *Kaempferia galanga* (kencur) and *Alpinia galanga* (galangal). Zingiberaceae is one of the largest families that has been widely used by the community, rhizomes contain essential oils. Having single leaves, alternating, compound flowers located at the tip of the pseudo stem or directly emerging from the rhizome and fruit in the form of capsules, used for food, spice, ornamentals, medicine, cosmetics, and ornamentals [38]. Of the 5 Zingiberaceae plant species, turmeric (*Curcuma domestica*) has a high utilization (52%), for traditional medicine, rituals, spices, dyes. Unlike in Lore Lindu National Park, this plant has no information on its existence and benefits. Kunyit (*Curcuma domestica*) has an active compound in the form of curcuminoids, which act as antioxidants. This compound has an inhibitory power of 90.526% to against free radicals [39].

3.2 The Benefits of Plants for the Balinese in Pondok Chief Village, North Bengkulu and Their Potential as Learning Resources

For ethnic Balinese in Pondok Kelapa Village, 11 types of use were found, namely for medicine (51 species), ornamental plants (43 species), food (29 species), rituals (28 species), spices (11 species), protective plants (6 species), and 2–3 species for boards, dyes, firewood, fences, and animal feed. The existence of plants in the yard is dominated by medicinal plants, namely 51 species. Crops are the main source for the Sundanese ethnic's life in Kalaparea Village, Nyangkewok Hamlet, and Sukabumi. The results showed that there were 101 types of food plants with 48 and dominated by Cucurbitae. Of the 101 plant species found, 48 of them were dominated by Cucurbitae. This plant is used by the local community of Nangkewok Hamlet as the main food source [40], 29 species of Balinese in Sunda Kelapa are found for food.

The aloe vera plant is used by the Balinese as a medicinal and ornamental plant. Based on the results of interviews conducted with 180 respondents in Tanzania, it was found that 11 species of Aloe were used as human medicine (73%). Aloe is often used as a malaria drug, while the part of the plant that is often used is the leaf [41]. Local wisdom regarding non-formal knowledge for life and culture is always passed down from one generation to the next. Ethnobotany is one part of local wisdom that studies the relationship between humans and plants which are often used for various kinds of food, medicine, construction, traditional rituals, and so on [42]. The study of ethnobotany can make a major contribution to the process of recognizing the natural resources that exist in an area through the collection of local and cultural wisdom from and with the local community which is used to explain the interaction of local communities with their environment.

Biodiversity that is spread large enough that is used by traditional communities has not been explored to its full potential. The results of ethnobotany research yield information that Indonesia is a repository of biodiversity that stores more than 239 types of food plants [43]. Along with the richness of plant biodiversity, Indonesia also has ethnic diversity with different and unique traditional and cultural knowledge. This makes a lot of human interactions with plants that cause interest to be studied. Studying plant science is mostly done in terms of molecular, cellular, origin, diversity and classification systems, to the function of plants and their role for humans. This ethnobotany has the potential to reveal the traditional knowledge of certain ethnic groups in managing biodiversity and the way they conserve them, which are wrapped in their respective cultures [44]. Plants in Balinese culture have several dimensions, namely as commodities, medicines, ceremonial ornaments, symbols, and things related to magical elements, etc. For the Balinese, plants have a very important meaning. There is a tradition called Tumpek Uduh, which is a special day for worshipping the god of plants [45].

The results of studies on the Balinese ethnicity in Pondok Kelapa Village, Bengkulu, here are 115 types of plant species used by the Balinese ethnic community there. The findings of this exploration can be used as teaching materials based on the culture of the surrounding community. The introduction of plants and their benefits in the Plant Taxonomy Course will be contextual, making learning more meaningful. Environmental-based learning will bring high motivation for students. The results of other studies show that the use of plants around the school environment can improve student learning outcomes and activities [46]. In a learning environment, the existence of students, learning resources and educators have a close relationship in the learning process. Education has an important role in creating critical, creative, and caring people in managing biological resources. It aims to shape the personality of students who are spiritually, intellectually, and socially intelligent. Culture and project-based learning environments that require group work need to be prepared [47, 48]. Maintaining the sustainability of ethnobotany in a local community will never disappear even though technology and science are always developing, ethnobotany has a role in integrating cultural knowledge for development in the fields of arts and culture, health, food [49]. This is also closely related to the Independent Higher Education curriculum to Learn Campus Merdeka, where the curriculum at the formal school level can be a tool for to prevent the existence of local culture erosion [15], so the role of culture-based learning resources is an important role.

4 Conclusion

From the results of a survey of plants used by ethnic Balinese in Pondok Kelapa Village, North Bengkulu, it was found 2 divisions of plants (Pteridophyta, Magnoliophyta), 56 families, 115 species of plants used for food, board, medicinal, ornamental, ritual, spices, dyes, protection, firewood, fence, fodder Taxon A family with many species, successively Araceae (7 species) Arecaceae (5 species), Euphorbiaceae and Zingiberaceae (4 species). The most widely cultivated plants were *Cordylene/andong*, (80%) *Bougainvillea* (68%), *Curcuma domestica* (52%) *Cocos nucifera*, *Musaenda* (50%) *Manihot/cassava* (42%). The number of plants found in the yard is related to their frequent use in rituals and food needs. Plants that are dominant in terms of taxonomy and presence in the yard can be developed as learning resources in the Plant Taxonomy course.

Acknowledgments. Thank you to all participants who have contributed to the research and writing of this article. Thank you also to the faculty of teacher training and education at Bengkulu University for providing research grant through the learning quality improvement research scheme (PPKP) in 2021.

References

1. Rahayu, M., Arifa, N., Nikmatullah, M., Keim, A.P.: Pengetahuan lokal dan keanekaragaman tumbuhan berguna pada masyarakat batulanteh, Pulau Sumbawa, Nusa Tenggara Barat: sebuah kajian etnobotani. *Journal of Tropical Ethnobiology* 3(1), 28–42 (2020), <https://doi.org/10.46359/jte.v3i1.6>.
2. Wiryono., Lipranto: The diversity of locally useful plants in batu ampar village near bukit raja mandara protected forest area in south Bengkulu district. *Jurnal Manusia dan Lingkungan* 20(2), 119–128 (2013).
3. Wiryono., Japriyanto., Erniwati: The diversity of locally utilized plants and local botanical knowledge in Central Bengkulu District, Bengkulu Province, Indonesia. *Biodiversitas* 18(4), 1589–1595 (2017), <https://doi.org/10.13057/biodiv/d180437>.
4. Winanda, G.A.: Keragaman jenis tumbuhan yang dimanfaatkan masyarakat suku rejang desa kota agung kecamatan bermani ilir Kabupaten Kepahiang Provinsi Bengkulu. Skripsi. Jurusan Kehutanan.Fakultas Pertanian, Universitas Bengkulu (2018).
5. Mahitra, H.: Studi etnobotani suku bali di sekitar hutan lindung bukit daun desa suro bali Kabupaten Kepahiang Provinsi Bengkulu. Skripsi. Jurusan Kehutanan Fakultas Pertanian, Universitas Bengkulu (2019).
6. Wiryono, Wanandi, Y., Ilahi, A.K., Deselina., Senoaji, G., Siswahyono: The local knowledge of the plant names and uses by Semende tribe people in Kaur District, Bengkulu Province, Indonesia. *Biodiversitas* 20(3), 754–761 (2019), <https://doi.org/10.13057/biodiv/d200320>.
7. Alexon, Pembelajaran Terpadu Berbasis Budaya. FKIP UNIB Press, Bengkulu (2010).
8. Zukmadini, A.Y., Kasrina, K., Jumiarni, D., Rochman, S. Pocketbook based on local wisdom and its effectivity in improving students' knowledge on the utilization of traditional medicine plants. *Biosfer: Jurnal Pendidikan Biologi* 13(1), 59–74 (2020).
9. Lilawati, J.: Analisis Pemanfaatan Sumber Belajar Dalam Proses Pembelajaran. Seminar Nasional Tahunan Fakultas Ilmu Sosial Universitas Negeri Medan Tahun 2017 (2019).
10. Siswanto, E.A.: Analisis Budaya Masyarakat Bali dalam Upaya Meningkatkan Kesejahteraan Keluarga. Skripsi. Jurusan Ilmu Kesejahteraan Sosial FISIP, Universitas Bengkulu, (2012).
11. Fitria, R.: Komunikasi multikultural dalam menjaga kerukunan antar umat beragama di Kabupaten Bengkulu Tengah. *Manhaj Jurnal Penelitian Dan Pengabdian Masyarakat* 3(2), (2018), <https://Ejournal.Iainbengkulu.Ac.Id/Index.Php/Manhaj>.
12. Putri, R.I., Supriatna, J., Walujo, E.B.: Etnobotani tumbuhan penunjang ritual/adat di Pulau Serangan, Bali. *Prosiding Seminar Nasional Prodi Biologi F. MIPA UNHI* (2013).
13. Warseno, T.: Etnomedisine tumbuhan obat tradisional masyarakat bali. Conference Paper April Ekspose dan Seminar Pembangunan Kebun Raya Daerah, Membangun Kebun Raya untuk Penyelamatan keanekaragaman Hayati dan Lingkungan Menuju Ekonomi Hijau (2015), <https://www.researchgate.net/publication/289519075>
14. Sutomo., Iryadi, N.: Konservasi Tumbuhan Obat Tradisional “Usada Bali”. *Buletin Udayana Mengabdikan* 18(4), (2019). <https://doi.org/10.24843/Bum.2019.V18.I04.P11>.
15. Direktur Jendral Pendidikan Tinggi: .Panduan Penyusunan Kurikulum Merdeka Pendidikan Tinggi di Era Industri 4.0 untuk Mendukung Merdeka Belajar kampus Merdeka. Kementerian Pendidikan dan Kebudayaan, (2020).

16. Team Penyusun: Laporan Akhir Pengembangan Kurikulum Pendidikan Berwawasan Etnobiologi dan Lingkungan. Program Studi Pendidikan Biologi FKIP Universitas Bengkulu (2020).
17. Martin, G.J.: *Ethnobotany: a methods manual*. Chapman & Hall, London, (1995).
18. Luchman, H.: *Etnobotani dan manajemen kebun pekarangan rumah: ketahanan pangan, kesehatan dan agrowisata*. Selaras, Malang (2014).
19. Widiono, I.: Pemanfaatan oleh masyarakat Kabupaten Banyumas Jawa Tengah, *Proseding Seminar Nasional Etnobotani IV*, pp. 92–95, LIPI Press, Jakarta (2009).
20. Yuliati, S., Supriatna, J., Rifai, M.A.: Pemanfaatan jenis tumbuhan di Pulau Simeulue Nanggroe Aceh Darussalam. *Proseding Seminar Nasional Etnobotani IV*, pp. 103–110. LIPI Press, Jakarta (2009).
21. Adjie, B.: Trends in fern classification and general families Kebun Raya Purwodadi LIPI. Webinar Seri: Identifikasi Tumbuhan Herbarium Bogoriense, Bidang Botani, Puslit Biologi, LIPI dan Penggalang Taksonomi Tumbuhan Indonesia (PTTI), (2020).
22. Tjitrosoedirdjo, S.S.: *Taksonomi Tumbuhan Tinggi*. Penerbit Universitas Terbuka, Banten Indonesia, p. 3.3–3.25, (2019).
23. Tjitrosoepomo: *Taksonomi Tumbuhan Schyzophyta, Thallophyta, Bryophyta dan Pteridophyta*. Gadjah Mada University Press, Yogyakarta (1994).
24. Schuettpelz, E., Schneider, H., Prado, J.: A community-derived classification for extant lycophytes and ferns. *Journal of Systematics and Evolution* (2016), <https://doi.org/10.1111/jse.12229>.
25. Judd, W.S., Campbell, C.S., Kellog, E.A., Steven, P.F., Donoghue, M.J.: *Plant Systematics: a phylogenetic approach*. 2nd. sunderland. Sinauer Associates. Inc, USA (2002).
26. Michael, G., Simpson: *Plant Systematics*. Elsevier Academic Press Publications, Amsterdam Boston (2006), www.books.elsevier.com.
27. Boyce, P.C., Wong, S.Y., Ting, A.P.J., Low, S.E., Ng, K.K., Ooi, I.H.: The Araceae of Borneo-The genera. *Journal of Aroideana* 33 (2010).
28. IPGRI: *Descriptors for Taro*. International Plant Genetic Resources Institute. Rome, Italy (1999).
29. Sinaga, K.A., Murningsih., Jumari: Identifikasi talas-talasan edible (araceae) di Semarang, Jawa Tengah. *Bioma*, 19(1), 18–21 (2017).
30. Hartanti, R.E.D.P., Gumiri, S., Sunariyati, S.: Keanekaragaman dan karakteristik habitat tumbuhan famili araceae di wilayah Kecamatan Jekan Raya Kota Palangka Raya. *Journal of Environment and Management*, pp. 221–231 (2020).
31. Asih N.P.S., Kurniawan, A.: Studi araceae bali: keragaman dan potensinya widya biologi 10(02), 135–147 (2019).
32. Hsuan, K.: *Orders and Families of Malayan Seed Plants*. Singapore University Press, Singapore (1978).
33. Pratiwi, F., Sutara, P.K.: Etnobotani kelapa (*cocos nucifera* l.) di wilayah Denpasar dan Badung. *Jurnal Simbiosis* 1(2), 102–111 (2013).
34. Fitmatikamawati., Sofiyanti, N., Kholofah, S.N.: *Sistematika Tumbuhan*. Taman Kaya, Pekanbaru (2020).
35. Prabowo, P.: Pengembangan perangkat pembelajaran berbasis data euphorbiaceae hutan taman eden 100, *Jurnal BEST (Biology Education Science and Technology)* 2(2), 24–31 (2019).
36. Zaman, M.: Cassava production guidelines for food security and adaptation to climate change in asia and africa and the role of isotopic technique. International Atomic Energy Agency (IAEA) In Austria, pp. 1–68 (2018), <https://www.researchgate.net/publication/3265180680>.

37. Nwose, E.U., Bonaventure, C., Onodu., Anyasodor, A., Mathew, O., Sedowo., John, N., Okuzor., Culas, R.J.: Ethnopharmacological values of cassava and its potential for diabetes and dyslipidemia management: knowledge survey and critical review of report. *J Intercultural Ethnopharmacology* 6(3), 260–266 (2017), <https://doi.org/10.5455/Jice.20170606094119>.
38. Pitopang, R., Damry, R., Hamzah, B., Zubair, M.S., Amar, A.L., Fathurahman, F., Basri, Z., Poulsen, A.D.: Diversity of Zingiberaceae and its traditional uses by three different indigenous ethnics at Lore Lindu National Park, Central Sulawesi Indonesia. *Journal of Physics: Conf. Series* 1242, 1–7 (2019), <https://doi.org/10.1088/1742-6596/1242/1/012039>.
39. Pratiwi, D., Sidoretno, W.M., Aisah, N.: The combination of turmeric *curcuma domestica* rhizome extract and collagen in a serum formulation as an antioxidant. *Borneo Journal of Pharmac* 4(1), 36–42 (2021), <http://journal.umpalangkaraya.ac.id/index.php/bjop/article/view/1578>.
40. Cita, K.D.: Ethnobotany of food plant used by sundanese ethnic in kalaparea village, nyangkewok hamlet, sukabumi district, Indonesia. *Asian Journal of Ethnobiology* 3(1), 16–22 (2020), <https://doi.org/10.13057/Asianjethnobiol/Y030103>.
41. Amir, H.M., Grace, O.M., Wabuye, E., Manoko, M.L.K.: Ethnobotany of aloe L. (asphodelaceae) in Tanzania. *South African Journal of Botany* 122, 330–335 (2019), <https://doi.org/10.1016/j.sajb.2019.01.038>.
42. Surata., Ketut I.: Studi etnobotanik tanaman upacara hindu Bali sebagai upaya pelestarian kearifan lokal 05(02), 265–284 (2015).
43. Angraini, S., Miswan., Pitopang, R.: Kajian etnobotani tumbuhan berkhasiat obat suku tialo di desataopa kecamatan taopa kabupaten Parigi Moutong. *Jurnal Biocelebes* 10(1), 45–55, 2016.
44. Tapundu, A.S., Anam, A., Pitopang, R.: Studi etnobotani tumbuhan obat pada Suku Seko di Desa Tanah Harapan, Kabupaten Sigi, Sulawesi Tengah. *Jurnal Biocelebes*, 9(92), 66–86 (2016).
45. Adiputra, L.N.: Fungsi buah dandauntanaman dalam budaya bali sebuah kajian terhadap tanaman upacara. *Jurnal Bumi Lestari* 17(2), 118–12 (2017).
46. Eriawati: Pemanfaatan tumbuhan di lingkungan sekolah sebagai media alami pada materi keanekaragaman tumbuhan di SMA dan MA Kecamatan Montasik. *Jurnal Biotik* 4(1), 47–59 (2017).
47. Nurrohman, A., Rahardjanto., Wahyuni, S.: Keanekaragaman makrofauna tanah di kawasan perkebunan coklat (*Theobroma cacao* L) sebagai bioindikator kesuburan tanah dan sumber belajar biologi. *Jurnal Pendidikan Biologi Indonesia* 1(2), 197–208 (2015).
48. Fatmawati, B.: Pembelajaran berbasis proyek untuk meningkatkan ketrampilan berpikir kreatif mahasiswa. *Jurnal pengajaran MIPA* 16(2), 85–92 (2011).
49. Surata, I., Ketut, I., Gata, I.W.: Pengembangan buku ajar botani tumbuhan tinggiberbasis etnobotani masyarakat hindu baliseminar nasional riset inovatif III (2015).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

