

Local Knowledge of Katuk (*Sauropus androgynus* (L.) Merr) in East Java, Indonesia

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Available Online: 15th July, 2016

ABSTRACT

Katuk (*Sauropus androgynus* (L.) Merr.) has been known to increase the breast milk production since ancient time in Indonesia. The aim of this study is describing the use of *S. androgynus* (L.) Merr. in some traditional societies in East Java. This study was done during 2013 to 2014 in East Java with a majority ethnical and traditional population. Sampling area community was chosen according to the appropriate altitude habitat of *katuk*. This research was conducted by using in-depth interviews with purposive sampling technique. The results showed variation in the use of *katuk* in 4 traditional societies in East Java. The highest utilization of *katuk* was found in *Osing*, followed by the Pandalungan society, Madura Island, and Java society of *Mataraman*. *Katuk* in traditional societies is used as vegetables that enhancing breast milk, relieve fever, cough, food coloring, goats feeding, and for the salvation ritual traditions.

Keywords: Local knowledge, *Sauropus androgynus* (L.) Merr., East Java Indonesia.

INTRODUCTION

Indonesia has a culture utilizing the natural resources of animals and plants as a traditional medicine that it is passed down from generation to generation since ancient times. Medicinal plants, in Indonesia and other countries, such as Thailand, have economic value, both in the local community who live in rural areas and modern society who live in urban¹. Indonesia is known as a source of medicinal plants. One of the traditional medicinal plants in Indonesia that be known as facilitating breastfeeding is *katuk*². *Katuk* (*Sauropus androgynus* (L.) Merr.) is a plant species of familia Euphorbiaceae²⁻⁶ that it is a vegetable plant (cultivated vegetable). *Katuk* can grow as hedges in the yard, or in the vegetable garden, on land with height of 5-1300 meters (asl). *Katuk* is herbaceous with a height of 50 cm or 2 to 3.5 m^{4,6}. According to the USDA the native plants are spread in countries of temperate Asia (China) and tropical Asia (India, Sri Lanka, Vietnam, Indonesia, Malaysia, Papua New Guinea, and the Philippines)⁷. This plant is used for ornamental plants and consumed by humans in the form of vegetables. *Sauropus androgynus* (L.) Merr. is known as *katuk* (Indonesia), *cekur manis* (Malaysia), *Pak - Wanban* (Thailand) or a multivitamin plant (India). Since a long time ago, Indonesian people have been recognized *katuk* as a facilitate breastfeeding for mothers and the leaves are consumed as a vegetable, so there is an impression in most of the people that only women who breast-feed consume *katuk* as a vegetable. It is not clear whether *katuk* also in demand as a vegetable for the whole family. The research *Katuk* as a facilitator of breastmilk (ASI) has been done by Sa'roni et al., which showed an increase in milk production by 50.7% higher

compared to the group of mothers who were not given the leaf extract of *katuk*⁸. Given the potential *katuk* leaf to facilitator ASI, has opened a world of opportunities for livestock, which is shown by the results of research on quail, namely the improvement of the reproductive system and the quality of quail eggs^{9,10}. The potential of *katuk* as traditional medicinal plants in Indonesia is still limited use as a facilitator breastmilk (ASI)^{2,11}. Recent studies indicated that *katuk* as traditional medicinal plants, as facilitating breastfeeding, proved beneficial as antioxidants¹²⁻¹⁴. Antioxidants can neutralize free radicals, which in prevents infection and degenerative diseases. The leaves as an antioxidant because it contains vitamin C. Vitamin C in *katuk* leaves relatively high approximately 85.65%¹⁴ or 92.43 to 92.18 mg / 100g¹². Other compounds which act as natural antioxidants are flavonoids. Results of the research in West Java, from 11 original vegetables (indigenous) showed that *katuk* has the highest flavonoid content (831.7 mg / 100 g)¹⁵. *katuk* also has potential as antimicrobial or antifungal, it was assumed because of the presence of secondary metabolites are alkaloids, flavonoids, phenols, and glycosides¹⁶. Other study showed extract of *katuk* stem has potential as an antioxidant and antimicrobial, allegedly because of bioactive compounds such as phytol, phenol, and acetic acid¹⁷. Community life will continue to change with the development of modern technology. This affects change in culture and preservation of biological resources. For example in the conservation of *Katuk*, if its use as a breast milk that is passed from generation to generation on the wane, it is feared wild population will decline, due to nescience of *katuk* potential in the community. Public knowledge of the potential *katuk* other

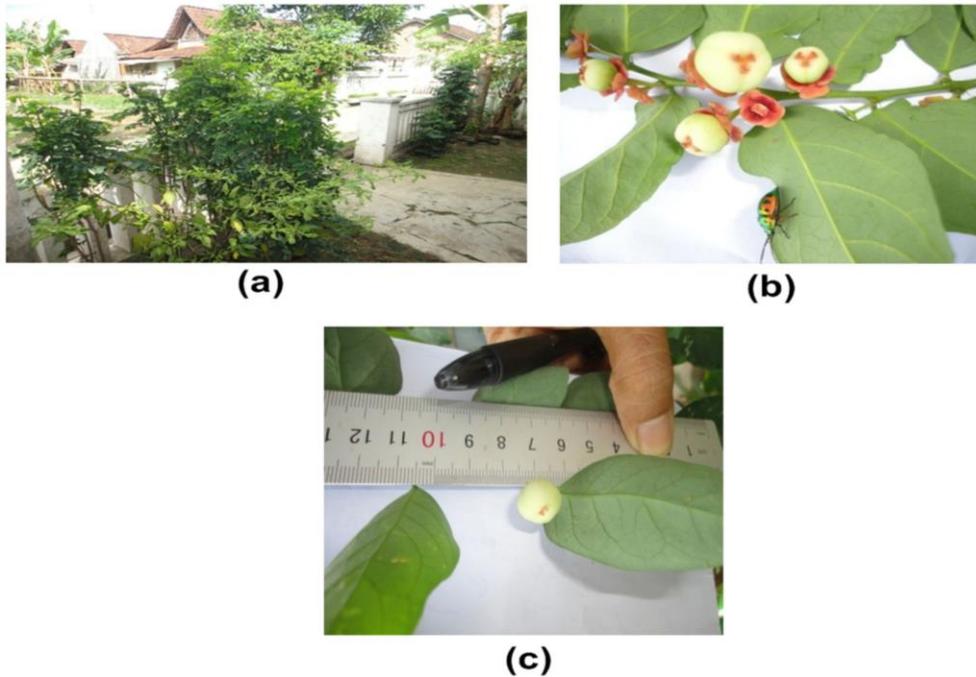


Figure 1: Morphological of *Katuk* from osing community: (a) Habitus, (b) Leaf, flowers, and fruits, (c) Scale of a fruit.

Table 1: Potential of *Katuk* and part of the plant that is used in the four traditional societies in East Java.

Society	A number of benefits	Types of benefits	Used parts
Osing	7	vegetables facilitating breastfeeding febrifuge cough medicine dye cake salvation wedding tradition (the bride's forehead ornament)	leaf
Pandalungan	4	vegetables facilitating breastfeeding febrifuge goat food	Leaf
Madura Pulau	4	vegetables facilitating breastfeeding febrifuge dye cake	Leaf
Jawa Mataraman	3	Vegetable facilitating breastfeeding Economic value (sold in the market)	Leaf

than as a facilitator ASI (medicinal plants), still very few, and even can be said to have not socialized. It is supported by the results of the initial survey of this study in 2013 on the benefit of *katuk*, *Katuk* more well-known as vegetables than as medicinal plant or vegetable garden fence and ornamental plants. Therefore, it is necessary to study the potential use of *katuk* in society, especially the knowledge benefits not only as a vegetable but also other potential such as medicinal purpose. The increasing knowledge of the benefits of *katuk* is expected to increase *katuk* population, thus it is necessary to maintain continuity. In Probolinggo, *katuk* plants have been known to have high nutrition value and high in vitamin C and used as one solution to overcoming malnutrition. The

importance of efforts to malnutrition, so that Probolinggo Regent launched Planting of *Katuk* on 15th November 2013 in the District of Maron. The activity was followed by other activities, such as creation menu festival made from *katuk* leaves by Probolinggo District Health Office¹⁸. An intervention of Local Government and related agencies offer great opportunities in conservation *katuk*. *Katuk* farming activities in the community also opened up opportunities for a more specific study of the characteristics of *katuk* as a justification of its importance. In terms of ethnobotany, a branch of biology that studies the interaction of plants with the community, that traditional communities have local knowledge (traditional wisdom) to the existing plants around them.

Local wisdom is the wisdom that is understood at a certain cultural communities¹⁹. If ethnobotany approach continues, there will be an increase in public awareness in the field of conservation. Many studies have been carried out on the ethnobotany of medicinal plants in Indonesia, but the new study specifically of *katuk* is little to known. For example, ethnobotany medicinal plants research has been conducted in Bengkulu province, especially in Serawai community found 41 species of medicinal plants with varied flavonoid levels but did not find any *katuk* plant species²⁰. Tesso Nilo National Park in Riau, *Sauropus androgynus* called *katuk* shoots, among 83 plants that are useful as a drug, but has a relatively lower potential value (ICS = 9), compared with other plant species that are useful as a drug¹⁹. Bogor Botanical Gardens found *katuk* plant, but its usefulness as a medicinal plant is limited as a facilitator of breastfeeding and only the leaves are used¹¹. Sutarto, Anthropologist from the University of Jember, found ten regions in East Java culture that have unique in style and wisdom of traditional cultures^{17,20}. Some regions are called Pandalungan Community (among others in Lumajang) and Osing Society (Banyuwangi). In these places still found a tradition passed down that describe the behavior of people in their life taking into account traditional knowledge everyday life, such as the utilization of traditional herbs for medicine, food, and board. Examples of ethnobotany research in Bromo Tengger Semeru community indicated they already have knowledge of system utilization that the growth potential is good enough, that is for food, medicine, building, rope, firewood, ritual, toxins, dyes, spices, ornamental plants, fodder, and plant conservation^{21,22}. Under the conditions of recent *katuk* cultivation and the benefits value in the community, it is important to conduct research on *katuk* plant based on the local knowledge, especially in traditional communities in East Java. The results are expected to be alternative strategic efforts in plant conservation through involvement *katuk* cultivation directly in the community, especially in East Java, as well as in general in the country of Indonesia. Therefore, the purpose of this study is to determine the utility of *katuk* in some traditional societies. This research was done to serve as preliminary data for community – based conservation efforts, particularly in East Java.

MATERIALS AND METHODS

This research was conducted from 2013 to 2014 in areas that represent traditional communities in East Java with a majority population of ethnic and traditional behavior which is still attached to people^{19,21}. Area community who have chosen the appropriate altitude of *katuk* habitat, between 5-1300 m asl⁴. Potential exploration of *katuk* performed on four areas of traditional communities in East Java, that are Java Community Mataraman (Pacitan at an altitude of between 29-824 m asl), Pandalungan community (Lumajang at an altitude of between 25-210 m asl), Madura Island society (Sumenep at an altitude of between 16-218 m above sea level), and the Society of Osing (Banyuwangi at a height of between 171- 453 m

asl). The morphological of *katuk* from Osing was showed in Figure 1. A sampling of respondents using in-depth interviews and open each other (open-ended) with purposive sampling technique that is deliberately chosen by the researchers to adjust the scope of the study²³. Respondents were selected regarding their knowledge about *katuk* plants, at least they have seen or planted *katuk*. Data ethnobotany *katuk* in aspects of their utilizing in traditional communities were analyzed based on tabulation descriptively. The data analyzed include *katuk* potential and benefits value of *katuk* (percentage).

RESULTS AND DISCUSSION

Katuk as one of the species of plants that given the scientific name *Sauropus androgynus* (L.) Merr. turn out to have some potential is in leaves only. Examples of other studies related to some potential in a species are *Lxora coccinea* Linn (Rubiaceae) leaves, flowers, roots, and stems are used as traditional medicine in India, among others, for the treatment of dysentery²⁴. Other plants in India namely *Pterocarpus santalinus* Linn.f. (Fabaceae) is also a traditional remedy for dysentery, eyes, and ulcers²⁵. Indonesia is a rich country in tribal or ethnic culture with distinctive characteristics. One of the province in Indonesia which has a diverse culture is East Java. According to Whitten et al., plant in Java (and Bali) have an important and diverse role, but there is no place that is sufficient to describe all the plants from their appearance, usefulness and their role in human culture or the function of importance in the ecosystem²⁶. The origin of the various plants used for spiritual people, food, and medicine have been lost in the course of time. Study on public perception of the Youtefa Gulf Nature Park (Jayapura) show that it influenced by age, income, non/formal education, and long-lived. Similarly in Nigeria, a study showed that the knowledge will increase with the increasing age. Women have knowledge of food plants better, while men better in the knowledge of plants for buildings (construction plants). The study was limited to gender and age²⁷. There are very many beneficial plants in Java, proved in the dictionary of useful plants by Heyne⁶. The wide range of benefits include herbs, vegetables, and preservatives. Indonesian traditional society develops traditional medicine from plants that have been identified by their ancestors for treatment and maintain health. This empirical knowledge has contributed to the development of traditional medicine in the country. According to Bermawie medicinal plants in Indonesia have economic value and high benefit of health in both local community and modern society. The existence of medicinal plants in their natural habitats affected by the damage to the of the ecosystem. A large number of medicinal plant species experienced loss of their natural habitat before it has not yet identified and known its benefits². The study on local knowledge is still limited to the use of the *katuk* leaves. While the results from previous studies show not only the leaves that can be used but also other parts of *katuk* can also be utilized. In this case, Heyne mentioned that *katuk* small pieces of

Table 2: The potential value of *katuk* in traditional society in East Java.

S. No.	Potential	Traditional society				The potential value (%)
		Osing	Pandalungan	Madura Pulau	Jawa Mataraman	
1.	Vegetables	+	+	+	+	100
2.	Facilitating breast milk	+	+	+	+	100
3.	Febrifuge (drug fever)	+	+	+	-	75
4.	Cough medicine	+	-	-	-	25
5.	Dye cake	+	-	+	-	50
6.	salvation	+	-	-	-	25
7.	Traditional of wedding	+	-	-	-	25
8.	Goat feed	-	+	-	-	25
9.	Economic value	-	-	-	+	25

Note. (+)= present ; (-) = absent

Table 3: Benefits of *Katuk* and how its use.

S. No.	Potentials	Society	How to use
1.	Vegetables	all	The leaves on the sprout are picked , washed, cooked in boiling water, flavored recipe vegetable nodes. Leaves and water are consumed as a side dish with rice.
2.	Facilitating breast milk	all	Similar benefits with vegetables. The water from <i>sayur bening</i> of <i>katuk</i> can be drink directly.
3.	Febrifuge (drug fever)	Osing Pandalungan Madura Pulau	<i>Katuk</i> leaves are washed, kneaded, then rubbed over the head (baby).
4.	Cough medicine	Osing	<i>Katuk</i> leaves are washed, kneaded, it is taken its water, then mixed water with <i>kencur</i> (<i>Kaempferia galanga</i> L.) and drink it.
5.	Dye cake	Osing, Madura Pulau	<i>Katuk</i> leaves are washed, crushed, squeezed, the water is put into the cake batter material to be colored, such as <i>tape ketan ijo</i> .
6.	Salvation	Osing	The leaves on the sprout are picked, washed, cooked in boiling water, the leaves were taken to complement the vegetables (<i>kuluban</i> - Java).
7.	Wedding tradition	Osing	<i>Katuk</i> leaves crushed, squeezed, the water to color the bride's forehead as bridal makeup (It is now rarely performed).
8.	Goat food	Pandalungan	The leaves on the plant sprout <i>katuk</i> were taken and given to goats as food.
9.	Economic value	Jawa Mataraman	<i>Katuk</i> shoots consisting of three branches, be tied in one bond of about five shoots, then sold in the markets.

white can be used for sweets. The roots are milled, boiled, drunk for fever, difficult urination, and foreign drugs yaws (*frambusia*)⁶. Wei et al., showed *katuk* bark extract has potential as an antioxidant and antimicrobial. It is possible to increase the use of *katuk* optimally if people know the benefits of other parts of *katuk* besides its leaf²⁸. By adding scientific knowledge to the public about the benefits of traditional *katuk*, apart from the knowledge they already have, then it is possible to increase the role of the community in the conservation of *katuk* plants in the future.

Potential of *Katuk* in Aspect Utilization

Results of exploration in all areas of traditional communities showed there is the potential of *katuk* in society. It found nine benefits of *katuk* that can be grouped into five potential: as food (vegetables, dye cake, goat food), beverages (breast milk for babies), medication (fever and cough), economic value, and tradition (salvation and marriage). In each society, there is a variation in the potential amount and type, but showed similarities on parts of plants which is used - leaves (Table 1).

Analysis of Potential Value of *Katuk*

Analysis of the potential value of *katuk*, descriptively in traditional societies showed the specific character of each

community (Table 2). In Table 2, it can be shown there are nine potential *katuk* in aspects utilizing at traditional societies. It is known that benefit of *katuk* as vegetables, facilitating breast milk (ASI), drug fever, cough, food coloring, the tradition of salvation, wedding traditions, food goats and economic value. The descriptive analysis results indicated the potential value that varies in every aspect. The highest potential value (100 %) on aspects of *katuk* as vegetables and facilitating breastfeeding are shown in all communities. The potential value of *katuk* as vegetables and facilitating breastfeeding can be found in all communities. According to Bermawie *katuk* to be useful as a medicinal plant for facilitating breastfeeding², while Hidayat stated that *katuk* for vegetables to mothers who are breastfeeding as facilitating breast milk¹⁰. It seems potential value of *katuk* as vegetables and facilitating breastfeeding is a potential that can be found in all communities across Indonesia, including traditional societies studied in East Java. Thus, it shows highest potential value. The next potential value (75%) *katuk* as febrifuge are found in three traditional societies: Osing, Pandalungan, and Madura. The same thing in the food coloring was still a tradition in the Osing community and Madura Pulau at the time this study was conducted. This is possible because of the similarities to the cultural influence of the three communities, which is Madura culture¹⁹. The third community consists of ethnic Madurese, thus, the potential value of *katuk* as febrifuge might have similar traditions. While in the Java Mataraman did not found *katuk* potential as a febrifuge. It is possible because there is no influence of Madurese culture. Then, the potential *katuk* as food coloring (50%) found in traditional two-influenced society Madura, namely Osing society, and Madura Pulau. According to the respondents, these two communities are usually use coloring with *katuk* in the making of *tape ketan putih*. Besides to provide an attractive green color on the white sticky tape, for the people of Madura Pulau, making the body becomes cold when consumed. In this case, Heyne noted the use of *katuk* since 1894 by Vorderman which leaves kneaded to produce green food coloring *kelepon* and *tape ketan*⁶. The same thing in the food coloring was still a tradition in the Osing community and Madura Pulau at the time this study was conducted. The next potential value of the lowest (25%), it found on the beneficial aspects of *katuk* as the cough medicine (Osing), salvation tradition (Osing), wedding traditions (Osing), goat feed (Pandalungan), and economic value (Java Mataraman). These results indicate a potential specificity of *katuk* in some traditional societies. This is possible because of the different perception. Public perception of the various aspects of life is affected by social environmental factors such as age, gender, and occupation. Other factors such as ethnicity, including factors that may also influence how the public perception of the use and value of resources in the vicinity^{27,29}. Nowadays more and more local people interact with modern life, especially youth, followed by the using of goods from abroad. This can cause a shift in values that can weaken traditional community closeness to nature, as

well as local conservation of ethics, is faded³⁰. According to Schopp - Gut and Fremuth that medicinal plants have an important role in the field of biology and ecology as a basis for granting access to the community's role in the conservation of natural habitats, which deals in setting and determining the conservation and sustainable use³¹. The study of medicinal plants in Indonesia has lasted more than 50 years. Among another study emphasis on the collection, inventory, ethnobotany, and conservation³².

The results of in-depth communication with the respondents showed that age and gender tend to give effect to the perception of aspects utilization *katuk* in traditional societies. Most of the respondents who were able to explain in more depth the potential of *katuk* are aged over 30 years with the female gender. More depth responses are based on respondents' answers in addition to mentioning the benefits of *katuk*, is also able to explain how to use them. In this study, it can be shown in Table 3 some notes on how to use *katuk* in traditional societies in East Java were studied. The results showed that there was variation in the use of *katuk* in four traditional societies in East Java, Indonesia. The highest utilization of *katuk* was found in Osing community, followed by the Pandalungan society and Madura Pulau, and Java Mataraman. Overall, the use of *katuk* in traditional societies have benefits as vegetables increase the amount of breast milk (ASI), relieve drug fever, cough, food coloring tape, for goats feeding, and for the salvation ritual traditions. All traditional societies in this study used *katuk* leaves as the parts of the plant that are utilized. It shows the importance of *katuk* leaves on each traditional society. This research serves as preliminary data for community-based conservation efforts, particularly in East Java of Indonesia.

ACKNOWLEDGEMENT

The author thanks to Brawijaya University, Malang for supporting this research.

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