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- **Short communication**

DIVERSITY OF WILD EDIBLE MUSHROOM IN GUNUNG TUKUNG GEDE NATURE RESERVES, INDONESIA

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Abstract

Wild edible mushrooms diversity utilized by the community in Gunung Tukung Gede (GTG) nature reserves were observed and documented. The exploration was carried out during September 2018 – June 2019 to collect wild mushrooms and gather information on utilizing wild edible mushrooms by interviewing the indigenous community. About 75 local people who live in Sukatani, Pasilaja, and Cimacan village in GTG nature reserves participated and gave information on utilizing wild mushrooms. The reported edible mushrooms were: *Auricularia polytricha, Coprinus* sp., *Termitomyces albuminosus, T. eurhizus, Boletus edulis, Cantharellus cibarius, Marasmiellus* sp., *Mycea* sp., *Pleurotus* sp., *Volvariella volvacea, Lentinus sajor-caju, Psathyrella* sp., *Oudemansiella* sp., *Schizophyllum commune,* and *Scleroderma sinnamariense.* The outcome will contribute information to preserve biodiversity and ecosystems in GTG nature reserves and potential edible mushroom to be used for improving food security.

Nowadays, mushrooms are popular valuable foods due to their excellent organoleptic properties. Significance of mushrooms as food is an invaluable addition to many recipes and perfect for vegetarian meat substitution (Feeney *et al.* 2014). Besides, mushrooms are also rich in healthy human nutrition, such as amino acids (Sun *et al.* 2017) and fatty acids (Dimitrijevic *et al.* 2019). As a good source of vitamins, mushrooms have high levels of riboflavin (vitamin B2), niacin, folates, and traces of vitamin C, B1, B12, D, and E (Valverde *et al.* 2015). According to FAO (2007), food insecurity due to unsustainable dietary choices has adversely influenced livelihoods in rural and urban communities, especially in Asia. To overcome the problems, mushrooms can be added and utilized as natural resources that are more nutritious and serve as a solution to the community's food security. Indigenous communities have used wild mushrooms as an additional source of food from plant or animal food supplies (Boa 2004). Other than nutritional purposes, wild mushrooms are also used significantly as nutraceuticals (Barros *et al.* 2008)

Gunung Tukung Gede (GTG) nature reserve in the Banten Province, Indonesia, is one of the preserved areas of biodiversity protection. The area of GTG is about 1.519,50 he and is designated as nature reserve conservation according to The Ministry of Forestry decree No.3622/Menhut-VII/KUH/2014 on May 6, 2014. The type of its ecosystem is a tropical rain forest, with an average rainfall 2,151 mm / year with temperatures between 17-25°C (BBKSDA 2016). Consequently, this area has relatively high humidity. The dense tree with favourable environmental conditions supports the growth of mushrooms. Until now, so far no information regarding wild edible mushrooms as among the Non-Wood Forest Products utilized by communities around GTG nature reserves is available. Therefore, this study was aimed to observe and document wild edible mushroom diversity utilized by the community in GTG nature reserves.

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The present study was conducted in the east and west regions of the GTG Nature Reserve, from September 2018 until June 2019. The relative humidity temperature light intensity and mushrooms' substrate characteristics were recorded at each sampling location. Documentation on the utilization of wild edible mushrooms was made by taking random interviews with indigenous community people of GTG nature reserves.

Wild edible mushrooms growing on different substrata were collected and recorded to identify mushrooms. The freshly harvested mushrooms were washed in, and spore print preparation was conducted by placing the pileus downwards in half white and half black paper. A drop of water was added to the upper surface of the pileus then the pileus was covered to maintain the humidity. After 12 hrs, the pileus was lifted, and the spores were observed. Collected wild mushrooms were dried by using an electrical air flow drier to make herbaria. Samples were stored in a paper bag during the research period with silica gel at the rate of 10% of the dry basis for further study (Drábková 2014). All herbaria were stored in the Laboratory of the Department of Biology Education, Universitas of Sultan Ageng Tirtayasa, Banten-Indonesia.

Before documenting edible mushrooms, semi-structured interviews were conducted using a questionnaire, personal conversations with local people, and a field survey was also carried out (Zheng and Xing 2009). Information on the wild mushroom fruiting body, such as carpophores shape, umbo, scale, the gills, color, gills edges, stipes, length, width, color, shape, type of veil, annuls, volva, cap color, cap surface, cap margin, cap diameter, stipe length, gill attachment, gill spacing and spore print was documented (Srivastava and Bano 2010). Individual spore characteristics like shape, size, and color were also recorded. The identification and classification were conducted by comparing recorded characteristics of mushrooms with the help of literature (Moser and McKnight 1987, Huffman *et al.* 2008).

A total of 75 local people participated in this interviews. About 73% of the interviews of respondent dominated by females, while males were 26%. The result revealed that women are more familiar and have a better knowledge to utilize wild 99% mushrooms. Women are usually responsible for their family, involved in every stage of mushroom utilization from collection to processing the mushroom into a served food. The ages of the respondent were between 18 and 60 years. It means that generational differences influence traditional knowledge on mushroom utilization as the knowledge accumulated with age. The gained information is transfered from one generation to the next without any recorded document.

Data about the local knowledge on wild edible mushroom utilization is compiled in Table 1 showed that among the wild mushroom of GTG nature reserves, 15 species were edible. Wild edible mushroom belong to Agaricaceae (3 species), Auriculariaceae, Boletaceae, Cantharellaceae, Marasmiaceae, Mycenaceae, Pleurotaceae, Pluteaceae, *Polyporaceae,* Physalacriaceae, Psathyrellaceae, Schizophyllaceae, and Sclerodermataceae.

Local communities identified the wild edible mushroom and named it using the local language-Sundanese. The names were designating species of the wild edible mushroom into two words. The first word, supa or suung, means mushroom, followed by a modifier that can be an adjective or noun. These modifiers indicate the sporocarp's morphology, such as the basidiocarp color, structure, or substrate.

The wild edible mushrooms grew on dead logs and wooden stumps and accounted for a high decomposition degree in forest wood. Ttwo ectomycorrhizal fungi were reported edible and consumed by the local community. *Scleroderma sinnamariense* and *Chantharelus cibarius* were associated with *Gnetum gnemon* and *Shorea* sp., respectively, In the present study, two species of *Termitomyces albuminosus* and *Termitomyces eurhizus* were reported to be consumed by local communities.

Table 1. Wild edible mushrooms of GTG nature reserves with their family, vernacular name, and substrate.

Name of wild mushroom	Family	Vernacular name	Substrate	Suporting literature	Voucher specimens
Auricularia polytricha	Auriculariaceae	Supa ceuli	Dead logs and wooden stump	Teoh *et al.* (2018)	SKT101, CM201
Coprinus sp.	Agaricaceae.	Supa beas	Dead logs and wooden stump	Nowakowski *et al.* (2020)	CMC202
Termitomyces albuminosus		Suung tunggal	Soil with termites	Thu *et al.* (2020)	PSL301
Termitomyces eurhi zus		Supa bulan	Soil with termites	Thu *et al.* (2020), Oyetayo (2012)	PSL302
Boletus edulis	Boletaceae	Supa kebo	Decaying organic matter in the soil	Boda *et al.* (2012).	SKT104 CMC203, PSL204
Chantharelus cibarius	Cantharellaceae	Supa meranti	Ectomycorrhizal fungi	Muszyńska *et al.* (2016), Drewnowska *et al.* (2017)	SKT108
Marasmiellus sp.	Marasmiaceae.	Supa glenter	Dead logs and wooden stump	Lallawmsanga *et al.* (2016)	PSL303
Mycena sp.	Mycenaceae	Supa payung	Dead logs and wooden stump	Greeshma *et al.* (2016)	CMC205
Pleurotus sp.	Pleurotaceae	Supa amis	Dead logs and wooden stump	Dicks and Ellinger (2020)	SKT102, PSL304
Volvariella volvacea	Pluteaceae	Supa jerami	Decaying organic matter in the soil	Wang *et al.* (2018)	SKT103
Lentinus sajor-caju	Polyporaceae	Supa cau	Dead logs and wooden stump	Gupta *et al.* (2016)	SKT105, PSL 305
Oudemansiella sp.	Physalacriaceae.	Supa tikukur	Dead logs and wooden stump	Shim *et al.* (2006), Xu *et al.* (2016)	CMC206
Psathyrella sp.	Psathyrellaceae.	Supa kiray	Decaying organic matter in the soil	Sitotaw *et al.* (2020)	SKT106
Schizophyllum commune	Schizophyllaceae	Supa mireg	Dead logs and wooden stump	Tovar-Herrera *et al.* (2018)	PSL306
Scleroderma sinnamariense	Sclerodermataceae	Suung tangkil	Ectomycorrhizal fungi	Linnakoski *et al.* (2018)	SKT107, CMC207

Local communities in GTG nature reserves had noticed and recognized the mushrooms nearby by carrying out their daily activities. They also learned the value of conserving fungal species, their ecological roles, and the consequences of this potential value if it is lost based on traditional knowledge. The preservation of this knowledge can promote a revaluation of wild mushrooms as resources and promote their conservation. Knowledge of useful wild edible mushrooms can also be revitalized, and their use encouraged so making a more significant contribution to food security (Zhang *et al.* 2014, Haro-Luna *et al.* 2019).

It may be concluded from the present study that wild edible mushroom diversity utilized by the local community in GTG nature reserves have been successfully documented. Fifteen wild edible mushroom species such as *Auricularia polytricha, Coprinus* sp., *Termitomyces albuminosus, Termitomyces eurhizus, Boletus edulis, Cantharellus cibarius, Marasmiellus* sp., *Mycea* sp., *Pleurotus* sp., *Volvariella volvacea, Lentinus sajor-caju, Psathyrella* sp., *Oudemansiella* sp., *Schizophyllum commune,* and *Scleroderma sinnamariense* were reported.

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