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Familiar Edible Flowers in Indonesia

Bagus Aji Kresnapati[1*], Muhammad Eka Putra Ramandha[1], Nurul Indriani[1]
[1] Pharmacy Study Program, Faculty of Health, Bumigora University, West Nusa Tenggara, Indonesia
Coressponding authors: ajikresnapati@gmail.com

Abstract

Flowers besides being used as ornamental plants, they can also be consumed. Flowers that can be consumed are called Edible Flowers. Edible flowers in general can be consumed directly, usually in tea or can be served in the form of processed food. Edible flowers contain phytochemical compounds such as anthocyanins, flavonoids, phenolics, carotenoids which are useful as antioxidants. Indonesia is rich in biodiversity with a variety of plant species that can grow, including edible flowers. There is diversity, but only a few edibles that can grow and are familiar to Indonesian people will be reviewed in this article.

Abstrak

Bunga selain berguna sebagai tanaman hias, ternyata juga bias dikonsumsi. Bunga yang dapat dikonsumsi dinamakan Edible Flowers atau bunga edible. Bunga edible secara umum dapat dikonsumsi secara langsung, biasanya dalam seduhan teh maupun dapat disajikan dalam bentuk olahan pangan. Bunga edible mengandung senyawa-senyawa fitokimia seperti antosianin, flavonoid, fenolik, karotenoid yang bermanfaat sebagai antioksidan. Indonesia kaya akan keanekaragaman hayati dengan berbagai macam spesies tanaman yang dapat tumbuh, termasuk diantaranya bunga edible. Keanekaragaman yang yang ada, namun hanya beberapa edible yang dapat tumbuh dan familiar di masyarakat Indonesia yang akan diulas dalam artikel ini.

Keywords: *Antioxidants, Biodiversity, Edible Flowers, Phytochemicals,*

Kata kunci: Antioksidan, Bunga edible, Fitokimia, Keanekaragaman Hayati.

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INTRODUCTION

Flowers can not be separated from the part of human life. Since ancient times, flowers have been used as ornamental plants, ceremonial events, flower gardens, food coloring, flavoring, and dish decoration. Interest based on consumption is divided into two, edible and non-edible flowers. Edible flowers are flowers that can be consumed, both in tea and processed food and drinks[1]. Edible flowers are a cultural heritage that has been known for centuries, such as natural medicine, coloring, dish decoration, flavoring, and also used as a religion[2]. Several edible flowers such as roses (*Rosa sp*) have been used since ancient Rowawi times as sweeteners, jams and drinks and desserts[1]. Gemitir flowers (*Tagetes Erecta*) in Mexico are used as traditional medicines, analgesics, antiseptics and in India as religious ceremonies [3]. Edible flowers can thrive in tropical countries including in Indonesia.

Edible flowers are found in Indonesian residential areas even though the name of the edible flower itself is not familiar to Indonesians. There are various species of edible

flowers, but some of them can grow in Indonesia. This literature study aims to provide information on edible flowers that grow in Indonesia.

METHODOLOGY

This review article uses the scientific literature study method. Data collection was collected online through ScienceDirect, Google Scholar and Google. The search for library sources was carried out by collecting literature studies on flowers that grow and are familiar in Indonesia. Flowers in Indonesia are grouped into edible and non-edible flowers.

Flowers in the edible flowers group and found in Indonesia are searched for the keyword "Antioxidant activity of Tagetes erecta Linn extract." or "Antioxidant activity of *Ordorato Canaga* Linn. extracts". The literature used in compiling this review article comes from national and international journals. Appropriate journals are then reviewed in their entirety, and presented in the form of a review of literature studies. The number of journals used is 28 journals which are then ranked into 1 literature study.

RESULT AND DISCUSSION

Buteterfly pea Flowers (Clitoria ternatea L.)

Butterfly pea (*Clitoria ternatea* L.) is a medicinal plant that thrives in Asia. Based on the identification of the seeds, this flower belongs to the Fabaceae family (*legumes*). Butterfly pea has potential health benefits, such as antioxidant, anticancer, antipyretic, anti-inflammatory, hypolipidemic, cardiovascular and analgesic. The anthocyanin content causes this flower to have a bright blue color which is the main characteristic of this flower[4].

Previous studies reported that butterfly pea has phenolic activity as hepaprotective and nephronprotective which is characterized by a decrease in liver function parameters such as *serum glutamate pyruvate transaminase* (SGPT), *serum glutamate oxaloacetate transaminase* (SGOT), alkaline phosphate (ALP) & total serum bilirubin (SB) and decreased kidney function parameters such as urea and creatinine levels in experimental animal models of hepatotoxicity and nephrontoxicity[5].

Butterfly pea functions as an antiproliferative. Previous research reported that Butterfly pea can significantly increase apoptosis and necrosis in colorectal cancer cells (HCT116), TT (thyroid cancer cells), and MCF-7 (breast cancer cells)[4]. This is because butterfly pea extract contains many polyphenolic compounds including anthocyanins, which have antioxidant activity with implications for cancer therapy[6]

Marigold Flower (Tagetes erecta L.)

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Marigold flowers (*Tagetes erecta* L.) are ornamental flowers used in religious ceremonies in Bali and India. Marigold flowers are characterized by yellow or orange color with flowers that are fat, slightly rounded, and have overlapping petals[7]. This flower has activity as an antioxidant, antibacterial, and hepatoprotective activity due to the content of bioactive compounds in this flower, such as alkaloids, essential oils and flavonoids, terpenoids, alkaloids, and saponins[8,9].

Marigold Flowers has antioxidant activity. Previous studies reported that essential oil of marigold flowers is effective as a free radical scavenger, and the flavonoid content present in marigold flowers has antioxidant activity such as radical scavengers and the ability to chelate metal ions[10]. Previous studies reported that the activity of lutein compounds contained in marigold flower supplements acts effectively as an antioxidant in the eyes, this is due to lutein's ability to neutralize free radicals formed by ultraviolet radiation on the retina[11]

Marigold flowers have activity as a hepatoprotective. Previous research reported that marigold flower extract can significantly reduce serum levels of markers of liver enzymes damaged by CCl4 (SGOT, SGPT, ALP, and total bilirubin). Liver histopathology showed that marigold flower extract reduced liver lesions such as liver cell enlargement, lymphocyte infiltration, liver necrosis, and proliferation of fibrous connective tissue caused by CCl4. Therefore, the results of this study indicate that marigold flower extract can protect the liver against oxidative damage due to CCl4[12].

Marigold flowers function as antidiabetic and antihyperlipidemic. Previous research reported that the activity of quercetagetin extracted from marigold flowers showed that gemitir flowers could prevent the activity of α-glucosidase and pancreatic lipase, as well as α-amylase, so that quercetagetin acts as a treatment for diabetes and obesity[13].

Rosella Flower (Hibiscus sabdariffa L.)

Rosella flowers (*Hibiscus sabdariffa* L.), known as rosella or red tea, belongs to the *Malvaceae* family, which is rich in anthocyanins and other bioactive compounds, which are associated with a number of health benefits such as decreased blood pressure and plasma cholesterol[14].

Rosella flowers have long been known as herbal medicine in the world. Rosella flowers contain phenolic compounds such as alkaloids, saponins, anthocyanins, sterols and tannins. Rosella flowers

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have long been consumed in the form of decoctions or teas which are useful in preventing diseases such as nephrontoxicity, hypertension, diabetes, coronary heart disease and cancer[15].

Rosella flowers have antidiabetic activity. Previous research reported that Rosella Flower Extract can reduce blood glucose levels in animal models of diabetic models[16]. Rosella flower has antihyperlipidemic activity. Previous research reported the effect of infusion of sabdariffa hibiscus in animal models of hyperlipidemia. The results of the study showed that infusion of rosella flowers can reduce lipid function parameters such as total cholesterol levels and triacylglycerides but not as high as the reduction with standard drugs (statins)[17].

Ylang-ylang Flower (Cananga ordorata L.)

Ylang-ylang flower (*Cananga ordorata* L.) is a plant that thrives in tropical and subtropical regions with a plant height of approximately 10 meters. Ylang ylang plants have stems that break easily at a young age. Ylang-ylang flower is one of the essential oil producers. Ylang ylang flowers are found in Southeast Asia, especially the Philippines, Thailand and Indonesia. Yellow-green and yellow ylang flowers can produce good quality oil[18].

Ylang ylang flower has hepatoprotector activity based on its ability as an antioxidant and anti-inflammatory. One of the hepatoprotector mechanisms in overcoming liver damage is by stabilizing free radicals that cause damage to liver tissue. Previous research showed that there was a decrease in SGOT/SGPT levels after being given ethanol extract of ylang flowers (*Cananga ordorata* L.) in experimental animals induced by CCL4[19].

Ylang-ylang flower has antihyperlipidemic activity. Previous research reported that there was a decrease in serum cholesterol levels after being given ylang flower extract. The content of flavonoids in ylang flowers functions as an antioxidant which has an effect on repairing serum lipids, modifying oxidized LDL, and increasing the basal metabolic rate. As antioxidants, flavonoids act as reducers of LDL levels[18].

Rose Flower (Rosa damascene L.)

Rose flower (*Rosa damascena* L.) is an ornamental flower plant that is much loved because of the beauty and fragrance of flowers. Roses originate from China which has spread to various countries, including Indonesia. In Indonesia, roses are enjoyed as cut flowers or used for traditional

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ceremonies. Since ancient times, rose essential oil has been used as a raw material for cosmetics, fragrances, aromatherapy, and various medical purposes. Red rose extract (*Rosa damascena* Mill) contains tannins, geraniol, nerol, citronellol, flavonoids which have antibacterial effects[20].

Rose flowers have phenolic compounds that act as antioxidants in hepatotoxicity. Hepatoprotective rosehip was carried out in experimental animals induced by CCl4 as a model of hepatotoxicity. In particular, hepatotoxicity may prolong sleep duration due to pentobarbital after carbon tetrachloride poisoning. The results showed that there was a 63% reduction in sleep duration. The observed hepatoprotective effect of rose flower extract was due to the flavonoids present in the extract, because these phytochemicals were claimed to be involved as hepatoprotectors in CCl4-induced toxicity[21].

Soka Flower (Ixora coccinea L)

Soka flower (*Ixora coccinea* L) is a flower in the Rubiaceae family. This flower is in the form of this shrub tree, spread in tropical countries of Asia and Africa. Soka flowers are used as ornamental plants and also traditionally to treat diarrhea, fever, headaches, wound medicine, and stomach ulcers[22].

Phytochemical tests from previous studies revealed that asoka flowers contain various bioactive compounds including flavonoids, alkaloids, glycosides, terpenoids and carbohydrates[23]. The compound content can inhibit bacterial growth by inhibiting bacterial cell wall synthesis, protein synthesis, and the formation of complex compounds against extracellular proteins that disrupt the integrity of the bacterial cell membrane [24].

Asoka flower has potential as an antimicrobial. Based on the results of research that has been done, extracts of sunflower seeds can inhibit the growth of *Staphylococcus aureus* and *Escherichia coli*. This result proved the formation of a clear zone around the disc. Based on the results of this study, soka flower extract has the potential to have greater inhibition against Gram-positive bacteria (*Staphylococcus aureus*) compared to Gram-negative bacteria (*Escherichia coli*)[25].

Ashoka flower has the potential as an anti-infection. Previous studies reported that gel formulation with a concentration of 10% extract of softwoods (*Ixora coccinea* L) has the potential as a therapy for infections caused by Staphylococcus aureus bacteria. 10% dose of soft-shelled flower extract is proven to be able to heal infected wounds in experimental animals caused by the Staphylococcus aureus bacteria seen in a reduction in wound diameter until the 11th day[23].

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Chrysanthemum flower (Chrysanthemum Indicum L.)

Chrysanthemum flower (*Chrysanthemum Indicum* L.) is used as an ornamental flower plant which is classified as a herbaceous plant, with slitted leaf edges andserrated, and arranged alternately onbranch or trunk. Chrysanthemum flowers belong to the plants of the kenikir-kenikir tribe or Asteraceae which includes various types of Chrysanthemums Plant stems growerect, soft in structure and green in color[26].

Chrysanrhemum flower has the potential to cure various diseases such as atherosclerosis, diabetes and others. Chrysanthemum flowers have been used in traditional medicine to relieve inflammatory diseases, gastroenteric problems, hypertension, bladder-related disorders, and uterine diseases such as menstrual irregularities and infertility. Chrysanthemum flowers contain flavonoids such as linarin, apigenin, acetin, and luteolin. Linarin is known as the best representative compound, which has been reported to have neuroprotective, hepatoprotective, and osteogenic differentiation effects. Previous studies reported that chrysanthenum flowers can significantly reduce fasting glucose levels, hemoglobin A1C (HBA1C) levels and increase insulin levels in animal models of diabetes[27].

Chrysanthenum flowers have the potential as an antihyperglycemic. Previous studies reported that chrysanthemum flowers can reduce the function of lipid parameters such as triacylglycerides (TG), *total cholesterol*, and *low-density lipoprotein* (LDL-C), *high-density lipoprotein cholesterol* (HDL-C) and can reduce glucose levels and liver function parameters such as total protein, *serum glutamic pyruvic transaminase* (SGPT), *serum glutamic oxaloacetic transaminase* (SGOT) in animal models of atherosclerosis [28].

CONCLUSION

This literature study aims to provide information about flowers found in Indonesia that are safe and can be consumed and as a reference for further researchers about the potential for edible flowers that are familiar in Indonesia.

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