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REVIEW ARTICLE

Article Review: Antioxidant Activity of Some Plants Found In Garut Arboretum

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Abstract: Free radicals in the form of atomic molecules do not have partners with high reactivity, free radicals can come from within the body in the form of metabolic waste products and from outside the body such as ultraviolet light, food, beverages, smoke and pollutants. The role of antioxidants is needed to reduce these free radicals. This article review aims to find out and examine scientific information from research that has been carried out regarding plants, especially in the Garut Arboretum which have antioxidant activity. The method of writing this article review uses a literature study through search engines such as Google Scholar, Pubmed, and NCBI. It is known that from 56 plant species found in the Garut Arboretum, 27 plant species have been studied to have antioxidant activity, including 15 plants with very strong antioxidant activity, 9 plants with strong antioxidant activity, and 3 plants with moderate antioxidant activity. Secondary metabolites that are responsible for antioxidant activity include flavonoids, alkaloids, saponins, and tannins.

Keywords: antioxidant, garut arboretum, free radicals

INTRODUCTION

A free radical is an unpaired electron atomic molecule with high reactivity.[1] Antioxidants are required in order to protect the body from the harmful effects of free radicals.[2] Based on literature studies, many medicinal plants contain antioxidants with various active ingredients that also play a role in supporting the body's resistance.[3,4]

Garut Regency has an arboretum, also known as a botany garden. An arboretum is a place where a wide variety of plants are collected and cared for, as well as information about the plants.[5] Garut Arboretum is located in the Kamojang Tourism Park area of Legok Pulus Village, Sukakarya Village, Samarang District, Garut Arboretum was inaugurated on April 28, 2005. Many of the plants in the Garut Arboretum exhibit antioxidant activity. 6 Based on the results of the plant inventory in a study conducted by Yulianti (2015), it is known

BULETIN FARMATERA

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that the Garut Arboretum has 27 tribes and 56 plant species.[7]

According to the findings of a plant inventory conducted by Yulianti (2015), the Garut Arboretum has 27 tribes and 56 plant species.[7] Encourage the need for a literature study of plants from the Garut Arboretum that have activity as antioxidants. This study is expected to provide scientific information to future researchers and the community, particularly those in the Garut area who are unfamiliar with the Garut Arboretum and its plant benefits.

METHOD

The author inventories the plants in the Garut Arboretum in order to find information on plants that will be used as reference material for the study. Furthermore, the search for sources for article materials is conducted online using search engines such as Google Scholar, Pubmed, and NCBI, with the main keywords "Antioxidant", "Antioxidant activity" as search terms. The journals used are national and international journals published in the last ten years that have been accredited by SINTA and SCOPUS (2012-2022). The screening is followed by data collection on plant parts, solvents, secondary metabolite content, test methods, concentration, and IC_{50} values.

RESULT

The following study results are summarized from various sources; several plants with antioxidant activity were obtained from the Garut Arboretum. According to the findings of the literature review, as many as 27 plants from the Garut Arboretum have antioxidant activity.

Table 1 shows the findings from the observation of several antioxidant plants.

No	Plant Name	Plant Parts	Solvent	Secondary Metabolites	Checklists	Method	Concentration	IC 50 rated
1	Lemonade (*Mangifera foetida* L.)[8]	Fruit	Methanol	alkaloid, flavanoid, saponin, tannin, terpenoid	Vitamin C	DPPH	5, 10, 15, 20 , 25 ppm	9,65 ppm
2	Mango (*Mangifera indica* L.)[9]	Fruit	Ethanol 70%	Flavonoid, alkaloid, saponin, tannin	Vitamin C	DPPH	12.5, 25, 50, 100 ppm	75,22 ppm
3	Guava (*Anacardium occidentale*)[10]	Leaf	Ethanol	Flavonoid, tanin, folifenol	BHA	DPPH	4, 6, 8, 10 ppm	7,22 ppm
4	Ambarella	Leaf	Ethanol 96%	Flavonoid,	Noni,Moring	DPPH	10,20, 30, 40,	49,97

BULETIN FARMATERA

E-ISSN: 2528-410X

	(*Spondias dulcis*) [11]			alkaloid, steroid, kumarin	a		50 ppm	ppm
5	Centella asiatica (*Centella asiatica* L.)[12]	Herbs	Methanol	Sterol, alkaloid, flavonoid, saponin	Vitamin C	DPPH	4, 8, 12, 16, 20, 100 ppm	78,26 ppm
6	Areca Nut (*Areca catechu* L.)[13]	Seed	Ethanol	alkaloid, flavonoid, tannin	Absorption of DPPH Compounds	DPPH	0,4, 0,9, 13, 18, 22 ppm	3.5 ppm
7	Cherry (*Muntingia calabura*)[14]	Fruit	Ethanol 70%	Alkaloid, flavonoid, antrakuinon	Kuersetin	NO, BCB, RO	100, 50, 25, 12.5, 6.25, 3.125 ppm	22,18 ppm
8	Ganitri (*Elaeocarpus ganitrus*)[15]	Leaf	Ethanol	Flavonoid, fenol	Vitamin C	DPPH	20, 40 ,80, 100 ppm	54,12 ppm
9	Cassava (*Manihot esculenta*)[16]	Leaf	Ethanol 70%	Steroid, terpenoid, flavonoid, tannin	Gallic Acid	DPPH	12,5, 25, 50, 100, 200 ppm	17,69 ppm
10	Teak (*Gmelina arborea* Roxb.)[17]	Leaf	Methanol	Flavonoid, Polifenol, Saponin and Steroid	Vitamin C	DPPH	20, 40, 60, 80 ppm	34,57 ppm
11	Mahogany (*Swietenia mahagoni* L.)[18]	Seed	Methanol water	Alkaloid, flavonoid, saponin, tannin	BHT	DPPH, HP, NO, RO	20, 40, 60, 80, 100 ppm	60,76 ppm
12	Mindi (*Melia azedarach* L.)[19]	Barks	n-Heksan,Methanol	Alkaloid, tannin, saponin, fenolik	Vitamin C	DPPH	50, 100, 150, 200, 250 ppm	66,79 ppm
13	Surian (*Toona sinensis* Roem.)[20]	Leaf	Methanol	Flavonoid, triterpenoid, fenol	Vitamin C	DPPH	20, 40, 60, 100, 200, 400 ppm	122, 37 ppm
14	Petai (*Parkia speciosa*)[21]	Leaf	Etahnol 96%	Flavonoid, fenol	Vitamin C	DPPH	20, 40, 60, 80, 100, 120 ppm	49, 74 ppm
15	Terap (*Artocarpus odoratissimus*)[22]	Leaf	Ethanol	Flavonoid, steroid	Vitamin C	DPPH	10, 50, 100, 250 ppm	45,30 ppm
16	Breadfruit (*Artocarpus communis Forst*)[23]	Leaf	Etahnol	Flavonoid, saponin, fenol, tannin	Kuersetin	DPPH	25, 50, 75, 100, 125, 150 ppm	131, 77 ppm
17	Mulberry (*Morus*	Stem	Ethanol	alkaloid,	Vitamin C	ABTS	40, 80, 120	83,18

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	alba L.)[24]			flavonoid, fenol, dan saponin			dan 160 ppm	ppm
18	Water Apple (*Syzygium aqueum*)[25]	Leaf	Ethanol (96%)	Alkaloid, flavonoid, saponin, tannin, kuinon, steroid	Vitamin C	DPPH	10, 15, 20, 25, 30 ppm	10,01 ppm
19	Guava (*Syzygium malaccense*)[5]	Leaf	Methanol	Flavonoid, alkaloid, tanin, saponin, kuinon	Vitamin C	DPPH	15, 20, 25, 30, 35 ppm	22,59 ppm
20	Guava *(Psidium guajava* L.)[26]	Leaf	Ethyl acetate	Flavonoid, alkaloid, tannin, saponin,	Kuersetin	DPPH	20, 40, 60, 80, 100 ppm	37,39 ppm
21	Bay leaf *(Syzygium polyanthum Wight.)*[27]	Leaf	Ethanol	Flavonoid saponin, tanin, and selenium	Vitamin C	DPPH	20 , 40 , 60 , 80 ppm	37,44 ppm
22	Starfruit (*Averrhoa bilimbi* L.)[28]	Fruit	Methanol	Flavonoid saponin, tanin, steroid	Vitamin C	DPPH	10, 20, 40, 80, 160 ppm	50,36 ppm
23	Pomegranate (*punica granatum*)[29]	Rind	Ethanol 70%	Flavonoid, fenol, karoten	Vitamin C	DPPH	0, 10, 25, 50, 100, 200 ppm	8,33 ppm
24	Pomelo *(Citrus grandis* L.)[30]	Rind	Ethanol	Flavonoid, fenol, saponin, alkaloid, steroid	Vitamin C	DPPH	100, 200, 300, 400, 500, 600 ppm	111,6 9 ppm
25					Kuersetin	DPPH	50, 100, 150 200 ppm	98,58 ppm
26	Lime (*Citrus hystrix* DC)[32]	Fruit	Ethanol	Flavonoid, alkaloid, kuinon	Leaves and twigs	DPPH	1.25 , 2.5, 5, 7.5, 10, 12.5, 15, 20 ppm	6,43 ppm
27	Bangle (*Zingiber purpureum Roxb.*)[33]	Rhizome	Acetone	Flavonoid, alkaloid, saponin	Kuersetin	DPPH	0, 20, 40, 60, 80, 100 ppm	91,51 ppm

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Table 2 shows the range of antioxidant activity strength34.

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No	IC_{50} (ppm)	Antioxidant Activity
1	<50	Very strong
2	50-100	Strong
3	100-150	Medium
4	150-200	Weak
5	200-1000	Very Weak

DISCUSSION

Based on the results of the previous study search, 27 of the 32 articles and scientific journals obtained were used as the main journals.

According to the research results of the article study, 27 plant species have antioxidant activity. Some of them have varying antioxidant power ranges, including fifteen plants that are classified as very strong antioxidants (IC50 = 50 ppm), namely Mangifera foetida L., Anacardium occidentale, Spondias dulcis, Areca catechu L., Mutingia cabulara, Manihot esculenta, Gmelina arborea Roxb, Parkia speciosa, Artocarpus odoratissimus, Sygizium aqueum, Sygizium malaccense, Psidium guajava L., Syzigium plantyum Wight., Punica granatum, Citrus hystrix DC., Mangifera indica L., Centella asiatica L., Elaeocarpus ganitrus, Swietenia mahagoni L., Melia azedarach L., Morus alba, Averrhoa bilimbi L., Citrus aurantifolia, and Zingiber purpureum Roxb are the nine plants in the category of strong antioxidants (IC50 = 50-100 ppm). Furthermore, three plants with moderate antioxidant activity (IC50 = 100-150 ppm) are Toona sinensis Roem, Artocarpus communis Forst, and Citrus grandis L.

Each plant has a unique composition of compounds. The antioxidant activity of such compounds against free radicals is determined by the type of content. Flavonoids, for example, can donate hydrogen ions to reduce the effects of free radicals.[18] Saponins act as antioxidants by increasing the production of SOD and catalase.[24] Tannins play a significant biological role as protein-setters and metal conspirators.

CONCLUSION

Antioxidant activity has been reported in plants found in the Garut Arboretum. The antioxidant activity of 27 plants has been reported, with 15 plants having very strong antioxidant activity, 9 plants having strong antioxidant activity, and 3 plants having moderate antioxidant activity.

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