



## Antioxidant Capacity Test and Phenolic Test of Coriander Leaf Extract (*Coriandrum sativum* L.) with DPPH Method

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### KEYWORDS

Coriander Leaf, Cilantro, DPPH, Antioxidant Test, Phenolic Test

### ABSTRACT

Coriander leaves, also known as cilantro, are part of the *Coriandrum sativum* L. plant that is widely used in cuisines around the world and has potential as a medicinal ingredient. It has a distinctive aroma and a fresh, slightly spicy, citrusy flavor and is often used as an ingredient in cooking. The plant can be recognized by its upright, hairless form and abundant branches. The leaves vary from thick at the base of the plant to slender and hairy at the top of the flowering stems. Coriander leaves have functions as health medicine, among others, as a remedy for relieving digestive, respiratory, and urinary tract problems. This study aims to evaluate the antioxidant and phenolic activities of the methanol extract of coriander leaves. Coriander leaves were extracted with methanol and tested for antioxidant activity using the DPPH method. This study used two main methods: in vitro and bioassay, to evaluate the samples. The in vitro method consisted of an antioxidant capacity test. The antioxidant capacity assay aims to measure the ability of the sample to neutralize free radicals. The total phenolic assay is used as a method to measure antioxidant capacity, by calculating the levels of phenolic compounds in the sample. The total phenolic content of coriander leaf extract was found to be 726.0 µg/mL. DPPH antioxidant capacity test obtained 132.12 µg/mL.

DOI: 10.58860/ijsh.v3i7.213

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### INTRODUCTION

Reactive Oxygen Species (ROS), especially hydroxyl and peroxy radicals, hydrogen peroxide, as well as superoxide radical anions, have long been known to cause oxidative damage to fats, DNA, proteins, and other cellular components (Jomova et al., 2023; Juan et al., 2021; Ozougwu, 2016). Excessive ROS production is associated with a variety of problems (Krumova & Cosa, 2016). Oxidative stress, caused by an imbalance between excessive ROS formation and inadequate antioxidant defenses (Adwas et al., 2019; Pisoschi & Pop, 2015; Rahal et al., 2014; Vasco et al., 2008). ROS is associated with many diseases such as cancer, cardiovascular diseases, as well as neurodegenerative diseases such as Parkinson's and Alzheimer's (Simpson & Oliver, 2020; Singh et al., 2019; Umeno et al., 2017).

One of the plants that is widely cultivated in Indonesia and is often used as a seasoning for cooking and medicinal ingredients is coriander. This plant belongs to the Apiaceae family with the scientific name *Coriandrum sativum* L. Coriander has long been used as a traditional medicine and has been applied in various countries such as Africa, China, and India (Ghina et al., 2023; Mahleyuddin et al., 2021). Coriander extract along with the bioactive compounds contained in it have been tested and shown a wide range of biological activities, including as an antioxidant, anticancer, sleeping pill, neuroprotective, sedative, anticonvulsant, analgesic, anti-inflammatory, and blood sugar regulator for diabetes. One part of coriander that is often used as a spice and medicine ingredient is the leaves.

Coriander leaves contain high amounts of vitamin A and vitamin C. Vitamin C content is up to 160 mg/100 g and vitamin A is up to 12 mg/100 g (Bhat et al., 2014; Kassahun, 2020; Önder, 2018).

The aim of this research is to assess the antioxidant capacity and phenolic content of coriander leaf extract using the DPPH (2,2-diphenyl-1-picrylhydrazyl) method. This study seeks to evaluate the effectiveness of coriander leaf extract in neutralizing ROS and to understand its potential as a natural antioxidant source. By determining the antioxidant capacity and phenolic content, the research aims to contribute to the scientific understanding of coriander's health benefits and its potential applications in disease prevention and health promotion.

## METHODS

The research was conducted in January–April 2024 at the Laboratory of the Department of Biochemistry and Molecular Biology, located at the Faculty of Medicine, Tarumanagara University. This research was carried out using bioassay and in vitro methods. In vitro testing includes DPPH. The sample used in this study was coriander leaf extract (*Coriandrum sativum* L.) Coriander plants are obtained from the city of Tangerang. In this study, coriander leaves were dried for 3-5 days without being exposed to sunlight. After drying, it is smoothed so that it becomes simplisia. After that, simplicia is extracted by maceration and percolation methods so that coriander leaf extract is obtained. The results obtained will be evaporated using a rotary evaporator until the methanol solution separates from the simplicia and becomes thicker.

## RESULTS and DISCUSSION

### Extract Phenolic Content Test

The total phenolic concentration is expressed in the form of mg gallic acid equivalents per gram of dry weight (mg GAE/g DW) so that mg GAE/g DW is obtained by the following formula:

**Table 1.**  
**Absorbance and Total Phenolic Levels of Coriander Leaf Extract**

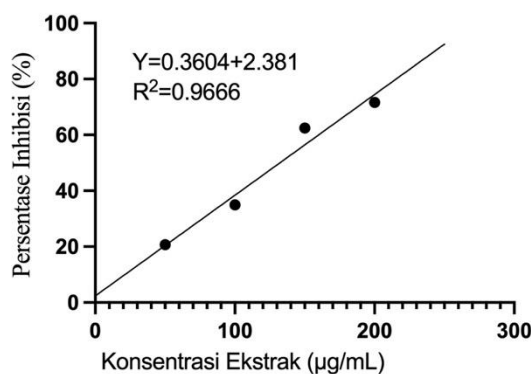
Coriander Leaf Extract	Average Absorbance	Phenolic Content (µg/mL)	Total Phenolic Content (2x) (µg/mL)	Phenolic Content (mgGAE/gr)
1	0,332	363,0	726,0	24,197

### DPPH Method Total Antioxidant Capacity Test

The linear line equation obtained is  $Y = 0.3604X + 2.381$  with  $R^2 = 0.9666$ . Using the linear line equation that has been obtained, the IC<sub>50</sub> value of coriander extract was obtained as 132.12 µg/mL.

**Table 2.**  
**Concentration, Inhibition Percentage, and IC<sub>50</sub> Value of Coriander Leaf Extract**

Extract Concentration (µg/mL)	Average Absorbance (516 nm)	Percent Inhibition	IC <sub>50</sub>
50	0,43	20,69	
100	0,35	34,98	
150	0,20	62,45	132,12
200	0,06	71,61	



(Figure 1.)

### Phenolic Extract Levels

The total phenolic content in coriander extract is relatively high, with a value of 24.197 mg GAE/g DW. This result is in line with the research of Nasution, et al. which obtained a value of 30.7049 mg GAE/g. Based on the classification of Vasco, et al., the phenolic levels belong to the "high" category (>5 mg GAE/g), indicating strong antioxidant activity potential.

### Antioxidant Capacity Test DPPH Method

This study tested the antioxidant ability of cilantro leaves in inhibiting DPPH free radicals, compared to Trolox. The results showed that coriander had moderate antioxidant activity, with an IC<sub>50</sub> value of 132.12 µg/mL.

Compared to Trolox, cilantro has weaker antioxidant activity. Trolox has an IC<sub>50</sub> value of 27,859 µg/mL, which is categorized as a powerful antioxidant.

The results of this study show that coriander leaves have the potential to be a source of antioxidants. This is in line with the research of Tansos E, et al. who found that the IC<sub>50</sub> value of coriander extract was 91.2287 µg/mL, which is categorized as a powerful antioxidant.

### CONCLUSION

This study aimed to evaluate the antioxidant capacity and phenolic content of coriander leaf extract (*Coriandrum sativum* L.) using the DPPH method. The results indicate that coriander leaf extract possesses a significant phenolic content of 24.197 mg GAE/g DW, which is considered high and suggests strong antioxidant potential. The antioxidant capacity, measured using the DPPH method, yielded an IC<sub>50</sub> value of 132.12 µg/mL, demonstrating that the extract has moderate antioxidant activity.

While coriander leaf extract shows promise as a natural antioxidant source, its antioxidant activity is weaker compared to Trolox, a well-known antioxidant, which has an IC<sub>50</sub> value of 27.859 µg/mL. However, the phenolic content and antioxidant activity of coriander leaf extract are consistent with findings from other studies, underscoring its potential for use in disease prevention and health promotion. The high phenolic content and moderate antioxidant capacity highlight coriander leaves as a valuable source of antioxidants, though further research and comparison with other antioxidants are warranted to fully establish its efficacy and potential applications.

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