

## An Updated review on the antioxidant potential of the Rutaceae family

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### Abstract

Rutaceae is also known as the citrus family, it is a flowering family having 160 genera. The significant genera in this family are Citrus which comprise *Citrus sinensis*, *Citrus limon*, *Citrus paradisi*, *Citrus aurantifolia*, *zanthoxylum*, and *agathosma*. This review documented the antioxidant potential of selected genera such as Murrayakoenigii, Citrus lemon, and Zanthoxylum.

**Keywords:** Rutaceae, Antioxidant, Murrayakoenigii, Citrus lemon, Zanthoxylum

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## 1. Introduction

Vepris is a genus containing about 80 species of trees and shrubs (Rutaceae family). They can be found primarily in tropical regions of Arabia, Africa, Zanzibar, Mascarene Islands, Madagascar, and southwest in India [1]. In traditional medicine, a variety of the genus Vepris used to cure a wide range of illnesses, such as pneumonia, lung conditions, renal issues [2], coughs, influenza, colds, cardiac pains, and eye troubles, [3,4], diuretic and antipyretic [5], headache [6], astringent and fortifier [7], as an aphrodisiac [8], tonic [9] for angina and rheumatism [4], menorrhagia and infertility [10], and for treating malaria both topically and orally [9]. The primary components of Rutaceae are limonoids, which have a variety of biological activities. Widespread scientific interest has been generated by the biological properties of limonoids, which are said to have antifungal properties [11], antiviral [12], antifeedant [13], anti-inflammatory [14], antiprotozoal [15], antimalarial [16], and antibacterial activities [17]. Recent studies have evaluated the antioxidant activity of citrus limonoids and extracts containing limonoids utilizing the racimat experiment, superoxide radical quenching, and diphenylpropylhydrazyl radical scavenging assays [18]. Furthermore, research on limonoids has shown that they can stop the growth of cancer in both lab animals and human breast cancer cells [19].

## 2. Murrayakoenigii

It is a Rutaceae-family scented pubescent shrub widely referred to as "Curry Patta." It is a leafy spice that is distinctive to real Asian-Indian cuisine. It is used in small amounts for both its distinctive aroma and for food preservation. It is a little tree that can reach heights of 4-6 m and has a trunk diameter of up to 40 cm. The pinnate leaves have 11–21 leaflets that are each 2 to 4 centimeter long and 1 to 2 centimeter wide. They have a strong scent. The flowers are tiny, fragrant, and white. The edible, tiny, black, glossy berries have deadly seeds. Mahanimbine, Murrayanol, and Mahanine from *M. koenigii* are credited with the antioxidant properties [20,21]. This medicinal plant's antioxidant capacities were assessed using the DPPH test. The plant is employed in Indian medicine to cure a variety of illnesses [22,23].

## 3. Lemon (Citrus lemon)

Rutaceae's lemon is a significant medicinal plant. It is mostly grown for its alkaloids, which have anticancer properties [24]. Strong antibacterial action is displayed by citrus peel oils. For instance, the minimum inhibitory concentration for *Pseudomonas aeruginosa* NCIM 2036 was 1:20 in the presence of the methanol, while the minimum inhibitory concentration for *Salmonella typhimurium* NCIM 5021 was 1:20 in the presence of the acetone. Inhibitory concentration is minimum for *Micrococcus aureus* NCIM 5021 was 1:20 in the presence of ethanol. By using GC/MS on lemon peel extract, the chemicals such tetrazene and coumarin were found [24]. It is discovered to have antioxidant properties as well [25].

#### 4. Zanthoxylum

The family Rutaceae includes the genus *Zanthoxylum*. This genus' plants are primarily used as spices and medicine. The term *Zanthoxylum* was first used by Linnaeus in 1757. Over 546 different species from all over the world make to the genus. In Asia and North America's tropical and temperate zones, there are 250 species of these. The plant *zanthoxylum* is dioecious. Some of them are bushes, while others are 20-meter-tall trees. Typically, the plants can be recognized by their thorny branches or trunks [26–28] The fruits are aromatic pericarp aggregates that resemble modified follicles. There is one sparkling black seed inside each fruit [26,27,29]. *Zanthoxylum* members, such as *Zanthoxylum piperitum* (Japan), *Zanthoxylum rhetsa*, *Zanthoxylum simulans* (Taiwan), and *Zanthoxylum schinifolium* (Korea) have been utilized as traditional spices (India). But in several regions of Asia and North America, In addition to being utilized as a spice, the genus *Zanthoxylum* is also utilized in folk remedy. An almost a single component of the plant has a specific purpose. *Zanthoxylum piperitum* is a plant that grows in China, Korea, and Japan; its pericarp and leaves are commonly used as spices. In the meantime, *Zanthoxylum americanum*'s wood and bark can be utilized as natural remedies for conditions like bronchial disease, skin sore, coughing, burns, congestion, itchy skin, ulcerated throats, wounds, and pulmonary issues [30]. It is commonly known that *zanthoxylum* plants, including *Zanthoxylum piperitum* (sansho, a Japanese spice), and *Zanthoxylum simulans* (Chinese red pepper) have natural scents that produce unusual sensations in the mouth when consumed. One of the genera found in Indonesia, *Zanthoxylum acanthopodium*, has been discovered to possess substances identical to those in *Z. piperitum* [31]. For generations, people have used spices as food enhancers. In addition to

improving the flavor and scent of food, spices also provide health advantages. Recent research has revealed that this spice has a variety of biological actions in addition to its distinctive flavor. For instance, the andaliman fruit possesses antibacterial properties that make it effective against several microbiological infections [32]. Additionally, it is an anti-inflammatory antioxidant that blocks the activities of tumor necrosis factor and -interleukin-6 cyclooxygenase [33].

The andaliman extract showed antioxidant activity when tested with ethyl acetate, methanol, and water; According to tests using the DPPH and ABTS procedures, the extract containing methanol had the highest antioxidant activity, with IC<sub>50</sub> values of 390.92 and 30.04 ppm, respectively. Only the methanol and ethyl acetate extracts of andaliman, with methanol extract having the highest activity, had any effect as -glucosidase inhibitors (IC<sub>50</sub>: 323 ppm). The results of fractionation indicated that the chemicals responsible for this bioactivity were auron from the flavonoids groups and flavonoids [34].

Breast cancer cells have cytotoxic and antioxidant activities. Poor antioxidant activity was demonstrated by crude andaliman extract made with petroleum. Breast cancer cells' cytotoxic action The IC<sub>50</sub> for T47D was 149.4 g/mL [35]. antioxidants and hypoglycemic agents When Japanese pepper (*Z. piperitum* DC.) and andaliman extracts were compared for antioxidant activity and -glucosidase inhibition, the Japanese pepper extract showed greater activity. However, after *in vitro* gastrointestinal digestion, the antioxidant activity of andaliman extract decreased by 2.77 times less than that of Japanese pepper extract, which decreased by 8.26 times. This finding revealed that andaliman extract's antioxidant activity was more persistent than that of Japanese pepper [36].

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