

Short Communication

## Medicinal plants of the Asteraceae family that contain limonene

[Plantas medicinales de la familia Asteraceae que contienen limoneno]

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**Abstract:** There are many different active ingredients in various plant species in different parts of the world. Limonene, one of these active ingredients, has attracted the attention of drug companies and researchers thanks to its powerful therapeutic properties. The aim of this study is to investigate the presence of plants containing limonene. This study was conducted not only to provide a brief overview of medicinal plants of the Asteraceae family that contain limonene, but also to allow researchers to find this information quickly. In this context, the diversity of plants rich in limonene has been examined.

**Keywords:** Limonene; Medicinal plant; Phytotherapy; Phytopharmacology.

**Resumen:** Hay muchos ingredientes activos diferentes en varias especies de plantas en diferentes partes del mundo. El limoneno, uno de estos ingredientes activos, ha llamado la atención de las compañías farmacéuticas e investigadores gracias a sus poderosas propiedades terapéuticas. El objetivo de este estudio es investigar la presencia de plantas que contienen limoneno. Este estudio se realizó no solo para brindar una breve descripción de las plantas medicinales de la familia Asteraceae que contienen limoneno, sino también para permitir que los investigadores encuentren esta información rápidamente. En este contexto, se ha examinado la diversidad de plantas ricas en limoneno.

**Palabras clave:** Limoneno; Planta medicinal; Fitoterapia; Fitofarmacología

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## INTRODUCTION

The Asteraceae family is one of the largest families of flowering plants, with over 1600 genera and 2500 species worldwide. Most members of the Asteraceae family have therapeutic applications, showing a wide range of anti-inflammatory, antimicrobial, antioxidant and hepatoprotective activities. Its pharmacological effects can be attributed to its range of phytochemical compounds, including polyphenols, phenolic acids, flavonoids, acetylenes and triterpenes (Rolnik y Olas, 2021).

Limonene is one of the most studied types of essential oils lately, and has been found in over 300 species of different plants (Zahi *et al.*, 2015; Simas *et al.*, 2015; Jongedijk & Cankar, 2016). It is a monocyclic monoterpene, 4-isoprenyl-1-methyl-cyclohexene (Badee *et al.*, 2011), with molecular formula  $C_{10}H_{16}$ . It is presented in the form of a colorless, oily, non-polar liquid with a strong odor, characteristic of citrus fruits, and which has lipophilic properties (Cirimina *et al.*, 2014). It also consists of one of the main compounds of several volatile oils from citrus peels (Lu *et al.*, 2014), with therapeutic (Li & Chiang, 2012) and aromatic properties (Zhang *et al.*, 2014).

The two enantiomers of limonene are the most abundant monoterpenes in nature. S(-)-Limonene (L-Limonene) is mainly found in a variety of plants and herbs such as *Mentha* spp, while R-(+)-Limonene (D-Limonene) is the predominant component of the oils in lemon peels and orange and the essential oil of *Carum carvi* L. (caraway) (Demyttenaere & Kimpe, 2001). In the case of citrus essential oils in general, R-(+)-limonene is its predominant component, reaching concentrations of 90% to 96% (Maróstica & Pastore, 2007).

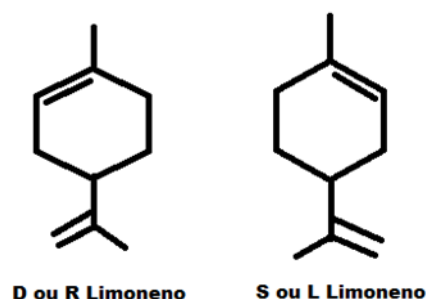


Figure No. 1  
Limonene enantiomers

## METHODOLOGY

We performed a systematic review of the scientific literature using the Science Direct, Web of Science, PubMed and Scielo databases using multiple combinations of MeSH terms: “Limonene” and “Medicinal plants and asteraceae”. We limited the search to studies on limonene alone. We do not exclude articles written in another language. We obtained 19 articles as results, of which 16 were selected after analysis because they correspond to the objectives of this study. Following this criterion, we chose and used 16 articles as reference for this review.

## RESULTS

Some plants containing limonene are included in Table No. 1. Thus, 17 species belonging to 17 genera have been included in this Table.

**Table No. 1**  
Shows the list of medicinal plants in which limonene is found

Family	Species	Reference
Asteraceae	<i>Dittrichia viscosa</i> (L.) Greuter	(Ouelbani <i>et al.</i> , 2016)
	<i>Arctotis arctotooides</i> (L.f.) O. Hoffm.	(Saleh-e-In and Staden, 2018)
	<i>Lactuca Sativa</i> L.	(Nomaani <i>et al.</i> , 2013)
	<i>Baccharis uncinella</i>	(Ascari <i>et al.</i> , 2012)
	<i>Ageratum fastigiatum</i>	(Souza <i>et al.</i> , 2019)
	<i>Gynura bicolor</i> DC.	(Do <i>et al.</i> , 2020)
	<i>Solidago canadensis</i> L.	(Elshafie <i>et al.</i> , 2019)
	<i>Crassocephalum vitellinum</i>	(Mukazayire <i>et al.</i> , 2011)
	<i>Guizotia scabra</i>	(Mukazayire <i>et al.</i> , 2011)
	<i>Helicbrysum gymnocephalum</i>	(Kasmi <i>et al.</i> , 2017)
	<i>Titbonia diversifolia</i>	(Farias <i>et al.</i> , 2019)
	<i>Xbantium strumarium</i>	(Sharifi-Rad <i>et al.</i> , 2015)
	<i>Tagetes minuta</i>	(Patel & Patra, 2014)
	<i>Vernonia anthelmintica</i>	(Aobuli <i>et al.</i> , 2018)
	<i>Matricaria chamomilla</i>	(Sokovic <i>et al.</i> , 2010)
<i>Chrysanthemum iscidehirtum</i>	(Khallouki <i>et al.</i> , 2000)	
<i>Artemisia nilagirica septentrionalis</i>	(Haider <i>et al.</i> , 2010)	

## DISCUSSION

In this study, 17 species were determined from which limonene was clearly isolated. According to the literature, it can be stated that limonene has antimicrobial, molluscicidal, sedative, hepatoprotective, antioxidant properties (Elshafie *et al.*, 2019; Farias *et al.*, 2019).

Many species of Asteraceae demonstrate various pharmacological activities, which have been attributed to their phytochemical components, including essential oils, lignans, saponins, polyphenolic compounds, phenolic acids, sterols and polysaccharides (Rolnik & Olas, 2021).

## CONCLUSIONS

Many of the species in the Asteraceae family have been used in traditional medicine since ancient times. Currently, the growing need for more natural sources of medicines has aroused scientific interest in medicinal plants. Studies have shown that limonene, a molecule that can be isolated from plants belonging to this family, has a positive impact on human health, thanks to its antioxidant, anti-inflammatory and antimicrobial potential.

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