

Toona sinensis

Chinese Toona

Surenbaum Toona sinensis



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Toona sinensis (Juss.) M.Roem, Meliaceae, a deciduous plant native to eastern and southeastern Asia, is widely used in Traditional Chinese Medicine. This paper was aimed to summarize the current advances in traditional usage, phytochemistry, pharmacology and toxicology of *T. sinensis*. In this review, various types of data of *T. sinensis* are discussed in the corresponding parts of this paper, and perspectives for possible future studies of this plant are discussed. The main constituents of *T. sinensis* are terpenoids, phenylpropanoids and flavonoids, *etc.*, and its pharmacological activities include anti-tumor effects, antioxidant activities, anti-diabetic effects and anti-inflammatory effects. Although a series of phytochemical and pharmacological researches of this plant have been

conducted, the active constituents and action mechanism of these activities should be also further explored. Furthermore, the present review also indicates that *T. sinensis* has potentials to develop into drugs for treating various diseases with high efficacy and low toxicity, particularly in cancer, diabetes and inflammatory disorders. In conclusion, the paper provides a full-scale profile of the traditional usage, phytochemistry, pharmacology and toxicology of *T. sinensis*, and also provides potential therapeutic uses and drug development prospects of this plant.



Toona sinensis has been used as a natural herbal medicine for thousands years based on its reliable pharmacological effects. The medicinal use of this plant was firstly recorded in Tang materia medica which is a famous TCM monograph written in Tang dynasty in China (Anonymous, 1999, Wang et al., 2014a, Wang et al., 2014b). In Chinese folk medicine, *T. sinensis* was described as an herbal medicine with good anti-inflammatory, detoxifying and hemostatic effects, and thus this plant was commonly used to treat enteritis, dysentery, urinary tract infection, leukorrheal diseases and skin itch (Anonymous, 1977, Anonymous, 1999, Li et al., 2006). Furthermore, due to its special onion-like flavor and wealth of carotene and vitamins B and C, the edible leaves and young shoots of *T. sinensis* are also delicious and nutritious food stuff in China and other Southeast Asia countries.

Volatile oils

As well known that, special perfume is one of the characteristics of *T. sinensis* plant, thus previous researchers have investigated

the volatile oils of this plant. For extraction of volatile oils from *T. sinensis*, the hydro-distillation and headspace solid-phase microextraction (HS-SPME) are commonly used, and gas chromatography coupled to mass spectrometry (GC-MS) is often used to identify the composition of volatile oil (Chen et al., 2009a, Li and Wang, 2014). Nowadays, over forty volatile components were isolated and identified from the tender shoots and leaves of *T. sinensis*. These constituents are mainly sesquiterpenes hydrocarbons, including caryophyllenes, β -caryophyllenes, copaenes and β -eudesmenes.



The present review provides a full-scale profile of the traditional usage, phytochemistry, pharmacology and toxicology of *T. sinensis*. In the present review, 109 compounds from different parts of this plant were summarized, and these compounds mainly concluded terpenoids, phenylpropanoids, and flavonoids, etc. Additionally, the existing pharmacological investigations have revealed that agents or extracts from this plant have a wide spectrum of pharmacological effects which is beneficial for the health of human being, in particular for its anti-tumor and hypoglycemic activities. Emerging evidences from animal experiments and in vitro studies have demonstrated some traditional uses of *T. sinensis*; however, new drug development for this plant is still require lots of detailed studies in both the preclinical and clinical works.

Firstly, currently there are few systemically ADME (absorption, distribution, metabolism, and excretion) and toxicities data of the compounds/extracts derived from *T. sinensis*, which is an important reason for the delay of new drug development of this plant. Thus, more works should be done on the toxicities and

pharmacokinetic profile of *T. sinensis*. Secondly, previous researches have reported various pharmacological effects of *T. sinensis*, however most of the researches only focused on the crude extract and gallic acid in this plant. Gallic acid has obvious biological activities, however, it's not a characteristic compound of *T. sinensis*. Due to this plant contains abundant terpenoids, extensive researches are required to investigate the pharmacological properties of monomers belonging to terpenoids in this plant. Third, as a traditional delicious food and nutritious food stuff, previous researches have revealed that this plant possesses good anti-tumor, hypoglycemic and antioxidant effects, the tender shoots and leaves of *T. sinensis* also have the huge potential for functional food development. Fourth, the *T. sinensis* was traditionally used to treat dysentery, enteritis, carminative, itchiness, and eye infections in Chinese folk medicine. However, not all of these traditional uses above were demonstrated by current pharmacological experiments; thus, more possible medicinal potentials of this plant might be investigated in the future. Lastly, there is no clinic trial of this plant, thus more works should be devoted to do some systemic clinic trials for *T. sinensis* in the future.

In conclusion, this paper systematically reviewed the traditional usage, phytochemistry, pharmacology and toxicology of *T. sinensis*, which might highlight the importance of this plant and provides some directions for the future development of *T. sinensis*.

