

A Systematic Review on *Platycladus orientalis*

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Abstract:

Platycladus orientalis (L.) Franco belong from Cupressaceae family, it is Chinese traditional drug and food additive, which is mainly used in the treatment of rheumatism, gout, diarrhea and chronic tracheitis. There are many diseases are treated by different extracts of *Platycladus orientalis*. Traditionally used in many diseases like acute vaginal bleeding, Flu, Bacillary dysentery, Hypertension, Insomnia, Skin lightening, Lymphoid tuberculosis, Suppurative mastitis, Whooping cough and Tinea mannum. As a Chinese traditional herbal medicine, leaves of *Platycladus orientalis* (Linnaeus) Franco (LPO) are used to treat Coughs, Excessive Mucus Secretion, Chronic Bronchitis, Bronchiectasis, and Asthma, etc. The plant *Platycladus orientalis* were used in treatment of Inflammation it possess Anti-inflammatory properties. It also used in the treatment of inflammatory airway diseases according to Chinese traditional system of medicine. *Platycladus orientalis* (L.) Franco is traditionally use as hair growth promotion. However, its main ingredients or active phytoconstituents are responsible for hair growth activity. The leaves of *Platycladus orientalis* posses Antioxidant as well as Anti-inflammatory activity due to presence of polyphenols.

Keywords: *Platycladus orientalis*, Linnaeus, Anti-inflammatory, Hypertension, Bronchiectasis, Asthma and Lymphoid tuberculosis.

INTRODUCTION

Platycladus orientalis (L.) is a important evergreen plant which is belong to the Cupressaceae family. It is a marvelous, multipurpose plant which has more medical importance and association with long life and vitality from the ancient traditional medicine system of China [1]. *Platycladus orientalis* (L.) Franco also has diverse pharmacological activities and therapeutic uses. The leaves and seed part of the plant *Platycladus orientalis* are used as a remedies in many Asian countries. In Chinese system of herbal medicine, the plant *Platycladus orientalis* is used as a cough remedy, expectorant, and hemostatic and it also used as a hypotensor, hemostatic and expectoant in Korean folk medicinal system. Leaves of the plant *Platycladus orientalis* contain many essential oils which are used in treatment of microbial infections, cancer, and many other kind of infections. *Platycladus Orientalis* (L.) plant mainly cultivated in Asian countries. Seed and leaves of the plant *Platycladus orientalis* are used as a functional food material which is approved by the China Food and Drug Administration (CFDA). There are more than 50 medicinal values are demonstrated with *Platycladus orientalis* due to its anti-inflammatory, antihyperlipidemic, antimicrobial, and neuroprotective biological activities. *Platycladus orientalis* have also contain flavonoids as active phytoconstituents which is used as antioxidant and anti-hyperuricemia. There are many different essential oils are also present in plant *Platycladus orientalis* which posses antimicrobial activity. Different diterpenes are also present in plant which are used as antifibrotic and as a anti-inflammatory. In plant *Platycladus orientalis* many polysaccharides are also present as a main phytoconstituents. These polysaccharides are used as anti-cancer, hypoglycemic, anti-inflammatory, immunological activities and in HIV. The information regarding structure of these polysaccharides is rare or not mentioned.

SCIENTIFIC CLASSIFICATION

Kingdom:	Plantae
Clade:	Tracheophytes
(unranked):	Gymnosperms
Division:	Pinophyta
Class:	Pinopsida
Order:	Pinales
Family:	Cupressaceae
Subfamily:	Cupressoideae
Genus:	<i>Platycladus</i>
Species:	<i>Platycladus orientalis</i>



Figure 1 *Platycladus Orientalis*

BOTANICAL DESCRIPTION

Platycladus orientalis (L.) a species belong to the Cupressaceae, is a small tree, with pyramidal crown. The stems and trunks of the plant are numerous, two type of branches are present in plant, primary branches are erect and secondary branches are very tufted and these branches are obliquely spreading-pendulous. The leaves of the plant which are mainly present at terminal branches are very small in size, scaly, imbricate, shining green in colour and the shape of leaves is oboval-rhomboid, with a linear gland on the lower surface. Fruit or female strobile portion of plant is ovoid in shape, up to 12 mm long, erect, scales mucronate, and glaucous; in male strobile are globular in shape, 2 mm long, yellow in colour, and erect; seeds portion of plant are thick, unwinged and ovoid in shape. Flowering period of plant is mainly is May. Mainly it grows in Iran. It is cultivated in the parks, gardens and boulevards of most temperate regions of Iran. Leaf portion of the plant is bitter in taste and has many uses like stomachic, diuretic, astringent, tonic and anti-fever actions. Extract of the leaf (Decoction) is mainly used to stop any type of hemorrhage. The ointment formulation of stems and leaves of the plant is mainly used in the treatment of onychomycosis [2].

GEOGRAPHICAL DISTRIBUTION

It is mainly distributed in China, Iran, and India. *Platycladus orientalis* mainly grow in sandy or loam soil, but in some cases it can also tolerate a wide range of different soil types and climatic conditions. Therefore, it is mainly distributed in places such as China, Japan, and Korea. The leaves of plant are can be collected throughout the year, but mainly in the summer and fall (State Administration of Traditional Chinese Medicine, 1998). *Platycladus orientalis* is known by different vernacular names in according to different geographical regions, such as in Chinese it is known as baishu, cebai, bianbai, and xiangbai. In English it is known as biota, book leaf pine, and Chinese thuja. In French it is known as thuya oriental and thuya de chine. In German is known as Morgenlaendischer Lebensbaum, Chinesische Thuja and Orientalischer Lebensbaum. In Italian it also called as tuia orientale and in Japanese it is called as konotegashiwa. In Spanish is known as uya de la China and Trade name Chinese arborvitae [3].

PHYTOCHEMISTRY

Part of plant	Phytoconstituents
Leaves	Monoterpenes, Deterpenes , Flavonoids , Lignans and Glycosides. labdane-type and pimarane-type diterpenes, such as isopimaric acid, sandaracopimaric acid, pinusolide and 15-methoxypinusolidic acid (15-MPA), and flavonoids, such as quercetin, quercitrin and amentoflavone. Several glycosides have also been isolated from the leaves, for example, 4-E-propenyl-phenol-1-O- β -D-rutinoside and degalloylmacarangioside B. Flavonoids and diterpenes are important in the context of the medicinal properties of <i>Platycladus orientalis</i> leaves [4].
Roots	Dried roots yields an essential oil and composition of essential oil is Bicyclic sesquiterpene, l-borneol, bornyl acetate, α -thujone and camphor, and a new sesquiterpenenic alcohol [5].
Oil of plant	α -Thujene, α -Pinene, α -Fenchene, Sabinene, Myrcene, α -Phellandrene, 3 Carene, Limonene, d-Terpinene, Terpinolene, 4-Terpineol, Terpinyl acetate , b-Cedrene, Caryophyllene, Thujopsene, α -Humulene, Germacrene D, Cedrol, Grouped compound, Monoterpene hydrocarbons, Oxygen-containing monoterpenes, Sesquiterpene hydrocarbons, Oxygen-containing sesquiterpenes [6].
Seed	Palmitic, Stearic, C18 unsaturated acids, Linolenic, and C20 un-saturated acids [5].
Pericarp	α -cedrol, 12 lhexa- and l-octacosanol, docosyl <i>trans</i> -ferulate, <i>cis</i> and <i>trans</i> -communic acids, 13 sandaracopimaric acid, 14,15 isopimaric acid, 14,15-bisnor-13-oxo8, 11(E)-labdadien-19-oic acid, 16 fatty acid, 15norlabda-8, 12(E)-diene-14-carboxaldehyde-19-oic acid, and bomesitol, 2, 4, docosyl <i>cis</i> -ferulate, 5, 6, sitosterol, palmitic acid, pinusolide, pinusolidic acid 5-hydroxy-7,4'-dimethoxyflavone 8,15-pimaradien-18-oic acid 15-hydroxypinusolidic acid,10 Docosyl <i>trans</i> -3-hydroxyferulate, platydiol,107-oxo-S, 15-pimaradiene-18-oicacid, sitostoryl-I-O-glucopyranoside [7].
Heartwood of plant	Aroma- dendrin, taxifolin, widdrene, cedrol, thujopsadiene, dehydro - α -curcumene, β -isobiotol and Curcumenether. It also con- tains an essential oil C is a complex blend of: Sesquiterpene hydrocarbons (cuparenes) 40; alcohols (Cedrol, widdrol, cuparenols) 50; monoterpene acids [8].
Fruit oil	α -pinene (52.4%), 3-carene (14.2%), α -cedrol (6.5%) and- phellandrene (5.1%), the leaf oil contained α -pinene (21.9%), α -cedrol (20.3%), 3-carene (10.5%) and limonene (7.2%) as the main components.

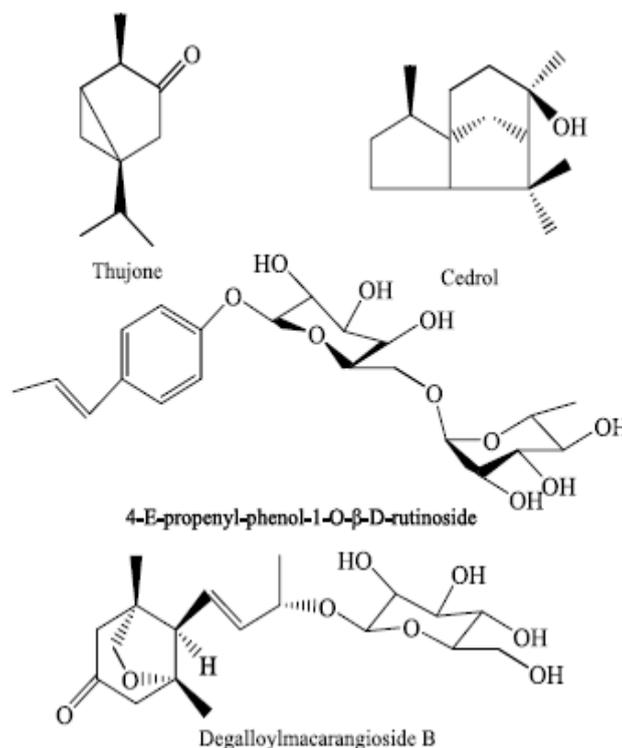


Figure 2. Structures of two monoterpenes and two glycosides isolated from *Platycladus orientalis* leaves [4].

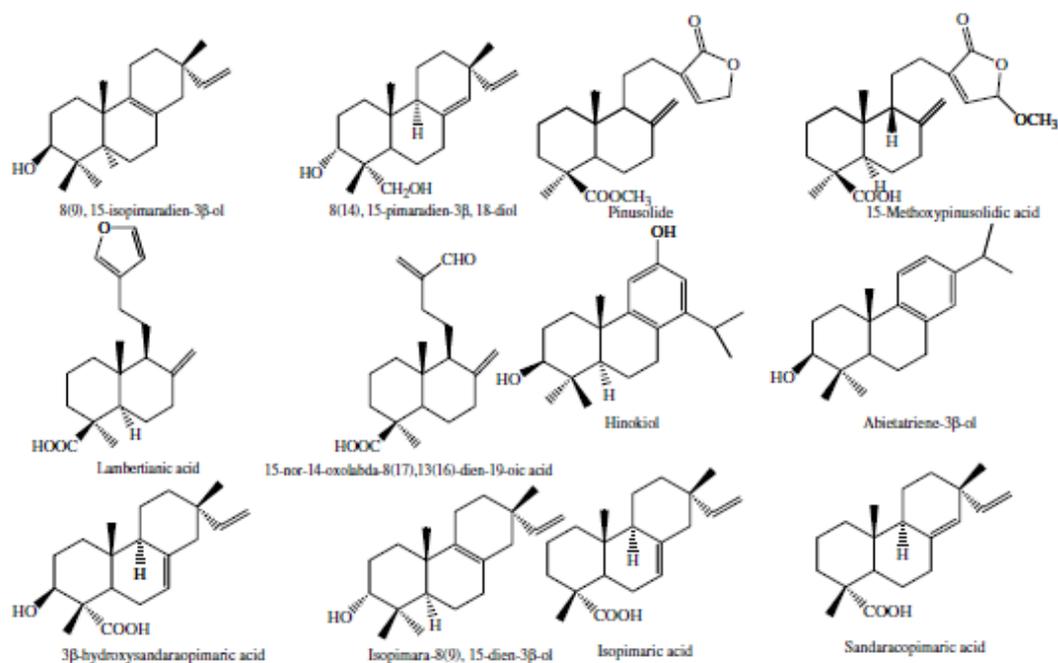


Figure 3. Structures of some diterpenes isolated from *Platycladus orientalis* leaves [4].

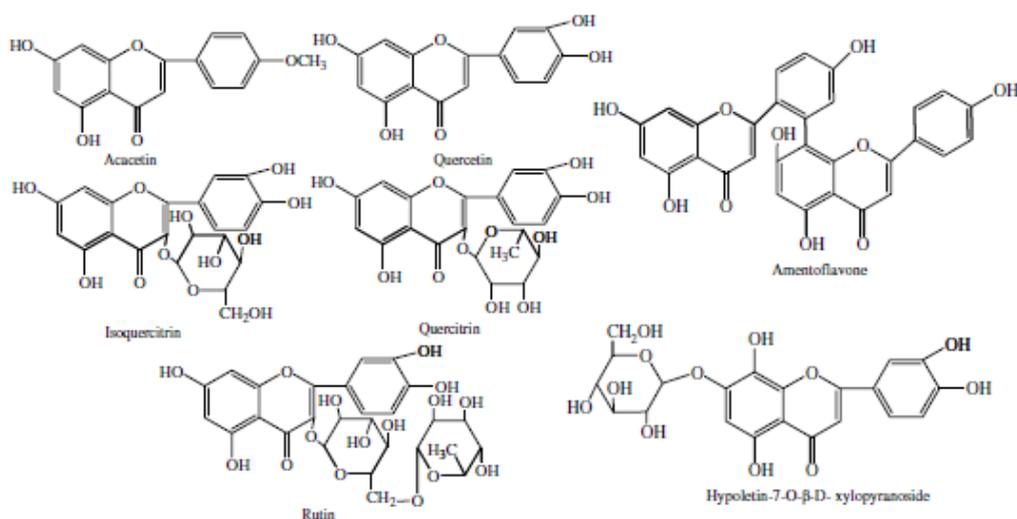


Figure 4. Structures of some flavonoids isolated from *Platycladus orientalis* leaves [4].

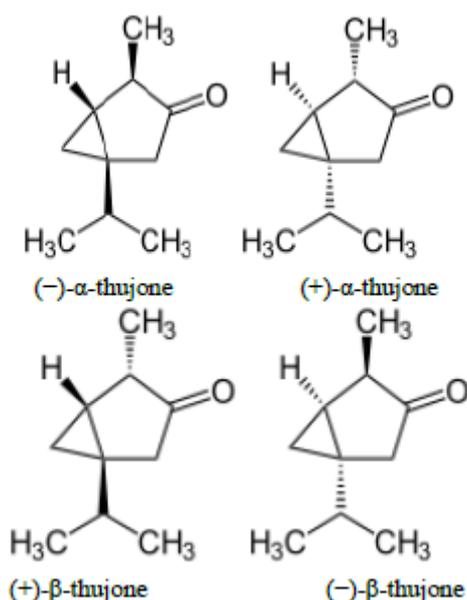


Figure 5. Structure of diastereomeric isomer of thujone [5].

TRADITIONAL USES OF *PLATYCLADUS ORIENTALIS*

Traditional uses	Mode of use	Place	Reference
Lymphoid tuberculosis	The leaves are applied to infected part	China	[9]
Rheumatoid arthritis	Juice of the leaves is mainly used to make wine	China	[10]
Scabies	Fresh juice used	Egypt	[11]
Whooping cough	Decoction of fresh leaves is taken orally	China	[12]
Recurrent oral ulcer	The paste of fresh leaves is applied to affected part	China	[13]
Mumps	Fresh paste of pounded leaves is made with albumen,	China	[14]
Tinea mannum	Decoction of leaves is applied topically	China	([9])
Acute vaginal bleeding	Consumed with other herb	China	[15]
Baldness	Fresh leaves are extract with 70% alcohol, and the extract is applied on the bald skin.	China	[6]
Diarrhoea	Decoction of the leaves is drunk as tea	China	[17]
Gonorrhoea	Unspecified	China	[18]
Hypertension	Decoction fresh leaves is drunk as tea	China	[19]
Insomnia	The leaves are put into pillow	China	[20]
Skin lightening	Ethyl acetate extract of the leaves is added into toilet cream	China	[21]

PHARMACOLOGICAL REPORTS

Pharmacological Activity	Extract Name	Mode of Action	Model Used	References
Anti-Inflammatory Effect	1. Digest of <i>P. orientalis</i> 2. Methylene chloride fraction of leaves. 3. Ethanol extract of leaves	1. Leaves can reduce the mPGE2 concentration in IL-1-stimulated cartilage explants. 2. Methylene chloride fraction of the leaves can significantly inhibit IL-6 in a time dependent manner (12–48 h) and dose-dependent manner (10–50 μ g/mL) in the LPS-stimulated RAW 264.7 cell, it also can inhibit LTB4 and 5-HETE formation in a concentration-dependent manner (12.5–100 μ g/mL) 3. Ethanol extract can inhibit biosynthesis of 12-HHT, 5-	Most of the data of anti inflammatory study are acquired through in vitro experiments.	[22,23,24,25]

		HETE and LTB4 in an in vitro experiment.		
Antioxidant Effect	Digest of <i>Platyclusus orientalis</i>	Both lipophilic and hydrophilic fractions can inhibit ROS production.	Alloxan-diabetic rats models	[11,26,27]
Antimicrobial Effect	1.Methanol extract, ethanol extract 2.Dichloromethane extract	1.Antiviral activity toward SARS-CoV, potato leaf roll virus and egg plant blister mottled virus. 2.Dichloromethane extract showed fungistatic activities toward <i>Alternaria alternata</i> and <i>Curvularia lunata</i>	In vitro methods	[28,29,30,31]
Diuretic Activity	Essential oils of <i>Platyclusus orientalis</i>	Induce a remarkable increase in urinary excretion as well as a significant rise in sodium excretion without inducing hypokalemia at dose level of 500 mg/kg.b.wt.	In vivo models	[11]
Insecticidal Activity	Ethanol extract of leaves	Molluscicidal activity on <i>Lymnaea acuminata</i> , with an IC50 value of 22.86 mg/L and 2.75 mg/L after 96 h.	In vitro models	[32,33,34,35]
Anticancer Effect	Ethanol extract of <i>Platyclusus orientalis</i> leaves	Decrease the proliferation activity of Burkitt lymphoma cell line (BJAB) and can induce apoptosis in up to 70%.	A549 (nonsmall cell lung adenocarcinoma), SK-OV-3 (ovarian cancer cells), SK-MEL-2 (skin melanoma), and HCT-15 (colon cancer cells) were used to evaluate anticancer effect. In vitro SRB assays.	[36]
Hair Growth-Promoting Activity	Decoction of the leaves	Inhibition of 5 α reductase and induction of β -catenin and Shh proteins	In vitro method inducing anagen in telogenic C57BL/6 N mice.	[37]
Antifibrotic Activity	Leaves extract	Totanol-reduced cell proliferation in part by necrosis as demonstrated by cell morphology as well as an increase of LDH release	HSC-T6 cells were used to assess the antifibrotic activity.	[38]
Anti-Hyperuricemic Action	Ethanol extract of the leaves	Reduce the serum urate levels.	Oxonate-induced hyperuricemic mice.	[39]

SUMMARY AND CONCLUSION

The available all recent scientific research on *Platyclusus orientalis* has shown the different part of plants are a very important medicinal herb with a wide range of ethnomedical treatments, mainly used for the treatment for baldness, chronic tracheitis, excessive phlegm, flu, malnutrition, cough and rheumatoid arthritis. The pharmacological study of the plant evaluated its anti-inflammatory, antioxidant, antimicrobial and hair growth-promoting activities. However, the leaves of plant are also used in the treatment of blood heat and hemorrhage syndrome, has not been sufficiently researched.

In conclusion, the present review on the botany, traditional uses, phytochemistry and pharmacology has provided preliminary information for further investigations and commercial exploitations of the herb. It can be concluded from the various literature that *Platyclusus orientalis* has the great effect against a number of health problems like bacterial, fungal and microbial infection. It has antioxidant, antiviral, insecticidal, diuretic and anti-cancer activity.

Platyclusus orientalis needs more attention by the researchers to evaluate its full beneficial and efficient use in the human welfare.

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