



ARENARIA SERPYLLIFOLIA L.: A REVIEW OF MEDICINAL USES, PHYTOCHEMISTRY AND PHARMACOLOGY

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ABSTRACT

Arenaria serpyllifolia L. is a medicinally important plant found in subtropical and temperate regions of Himalaya from Nepal to Kashmir. Plant is used traditionally to treat kidney and bladder related problems. Flavonoid and xanthone containing compounds such as epicatechin, japonicumone, quercetin etc are reported in plant. Plant have showed Inhibitory effects on Carboxyl esterase.

KEYWORDS: *Arenaria serpyllifolia* L., ethnomedicine, phytochemistry, pharmacology.

INTRODUCTION

The genus *Arenaria* consists of about 100 species, all are natives of cold and temperate regions and found in subtropical and temperate regions of Himalaya from Nepal to Kashmir.^[1] *Arenaria serpyllifolia* L. belongs to family *Carophyllaceae*. *Arenaria* is derived from Latin word *arena* which means sand, and *serpyllifolia* which referes to leaves similar to thyme and therefore in English it is known as Thyme leaved Sandwort.^[2] It has bitter and cool taste.^[3] Plant grows in dry and infertile lands, dry pastures, along ridges, road sides, lawns and waste places.^[4-6]

Arenaria serpyllifolia is a small annual herb of 7-25cm in height. Stem is slim and scabrid with profuse branching sometimes with or without glandular hairs. Petals are white but smaller in length than sepals. Flowering season of plant starts from March to April in plain regions while July to September in hilly areas. *Arenaria serpyllifolia* is found in different regions of world like Arabia, America, Eurasia, Ethopia, North-West of Africa and also in Pakistan.^[7] *Arenaria serpyllifolia* is self pollinating tetraploid specie.^[8]



Arenaria serpyllifolia L.

Taxonomical classification^[2,9-10]

Kingdom	Plantae
Subkingdom	Tracheobionta
Subphylum	Euphyllophytina
Super division	Spermatophyte
Division	Magnoliophyta
Class	Magnoliopsida
Order	Carophyllales
Family	Caryophyllaceae (Pink family)
Genus	Arenaria
Species	<i>Arenaria serpyllifolia</i>
Synonyms	<i>Arenaria leptoclados</i> (Rchb.) Guss <i>Arenaria serpyllifolia</i> L. ssp. <i>leptoclados</i> (Rchb.) Nyman <i>Arenaria serpyllifolia</i> L.ssp. <i>serpyllifolia</i> <i>Arenaria serpyllifolia</i> L. var. <i>tenuior</i> Mert and W. D. J. Koch <i>Arenaria petiolata</i> Hayata <i>Arenaria brevifolia</i> Gailib <i>Arenaria leptoclados</i> Gussone <i>Arenaria serpyllifolia</i> Bourg. ex.wilk and Lange <i>Arenaria serpyllifolia</i> subsp. <i>Leptoclados</i> Celak <i>Arenaria serpyllifolia</i> var. <i>Leptoclados</i> Rchb.

Botanical description^[2,5,7,9]

Characters	<i>Arenaria serpyllifolia</i>
Habitat	Disturbed area, sandy and rocky soil, along roads and paths.
Height	7-25cm.
Stems	Branching profusely, slender, scabrid, with or without glandular hairs or glabrous, sometimes glandular-scabrid above, glabrous or scabrid below.
Leaves	Leaves 3-7 x 2-5mm, ovate to ovate elliptic, acute or obtuse, withering at anthesis, 1-3 (-7)- veined, sometimes scabrid veins
Inflorescence	Laxly dichasial or frequently monochasial
Bracts	Herbaceous, ovate
Pedicle	Slender, longer than the sepals.
Sepals	3.5-4 mm, lanceolate, acute to acuminate, scabrid, ± glandular or glabrous, margin scarious, usually 3-veined.
Petals	White and smaller than sepals in length.
Capsule	Exceeding the sepals, rounded and thickened at the base, narrow above (flask-shaped), 0.3cm in diameter and enclosed by calyx.
Seeds	Grey to purple, black, 0.5cm in length, 10-15 in numbers, reniform, minute
Flowering	In the plains March-April, at higher altitudes in July-September.

Vernacular names of *Arenaria serpyllifolia* L., in different languages^[2,7,9-12]

Languages	Names
Chinese	Wu xin cai
Dutch	Gewone zandmuur, Zand muur
English	Sandwort, Sand worts, Thyme leaved sandwort, Thyme-Leaf Sandwort, Thymeleaf Sandwort, Chickweed Thyme leaf sandwort
Estonian	Harilik liivkann
French	Sabline á Feuilles De Serpolet
Finnish	Mäkiarho
German	Quendel - Sandkraut
Italian	<i>Arenaria commune</i>
Japanese	Nominotsuzuri
Korean	Byeo ruk I jari
Missouri	Thyme leaved sandwort
North America	Thymeleaf sandwort Sabline á feuilles de serpolet
Polish	Piaskowiec macierzankowy
Spanish	<i>Arenaria</i>
Slovenian	Navadna peščenka
Swedish	Sandnary

Traditional medicinal uses

Arenaria serpyllifolia is used in different regions of the world to treat various ailments. In China and Taiwan, plant is used to wash eye and treat dysentery.^[2] It is used as diuretic,

febrifuge, antitussive and depurative.^[3,10] Decoction of leaves, aerial parts and whole plant of *Arenaria serpyllifolia* is used to treat dysentery, bladder complaints such as acute and chronic inflammation of bladder. It is also used to remove kidney lime stones and to increase kidney function.^[10,13-17] In South Eastern region of China plant is used against fever, to detoxify and improve eyesight and relief cough.^[18] In Arab folk medicine it is used as digestive.^[19]

PHARMACOLOGY^[8,19]

Aerial parts of the plant showed inhibitory effect on esterase carboxyl enzyme activity.

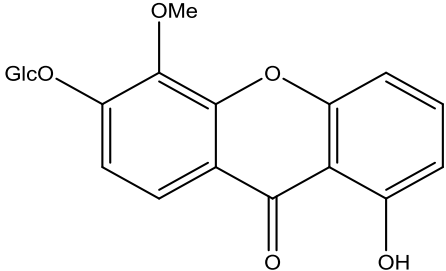
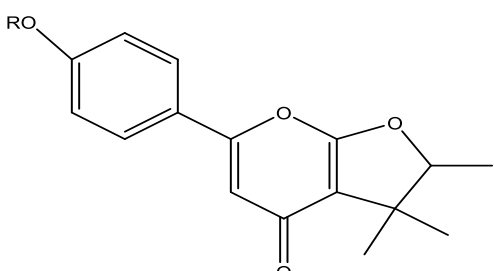
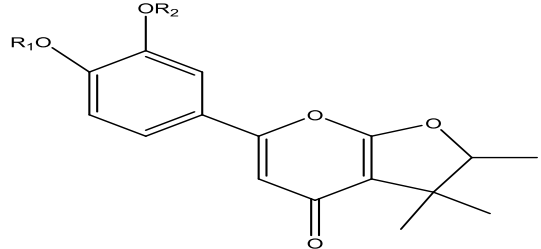
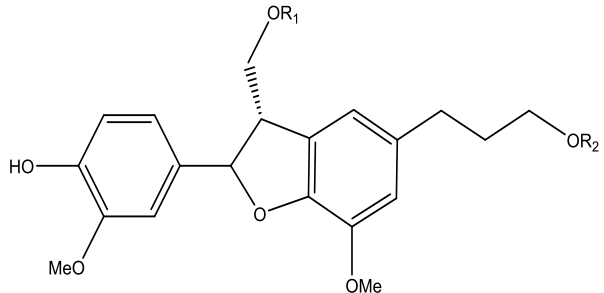
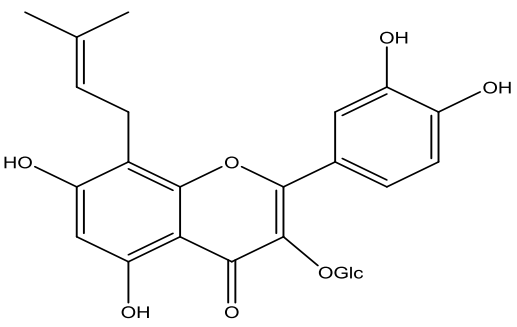
PHYTOCHEMISTRY^[18,20]

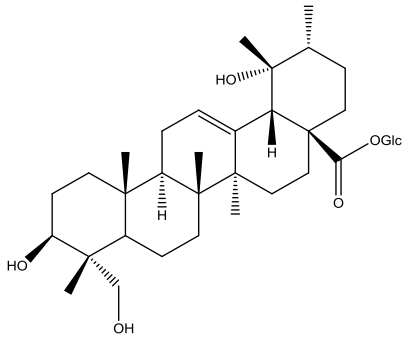
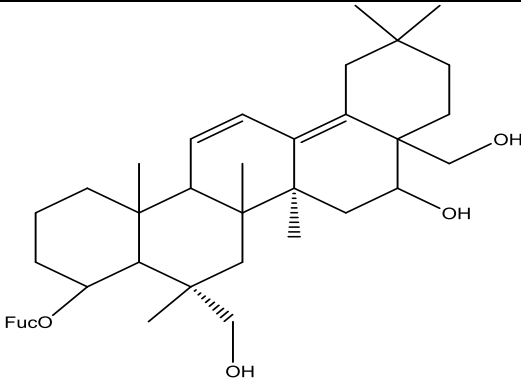
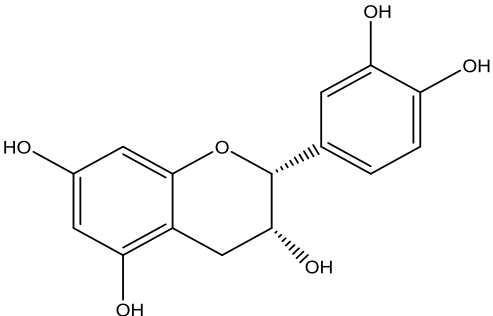
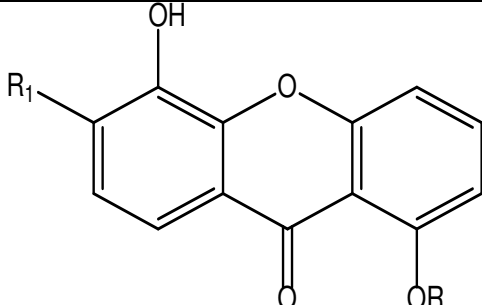
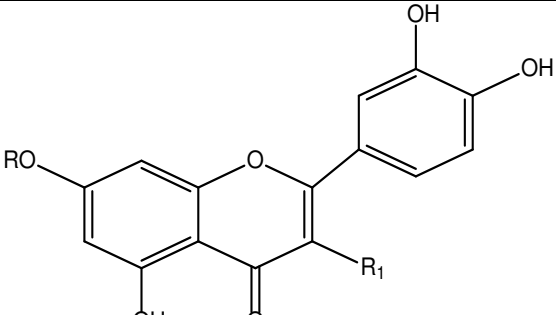
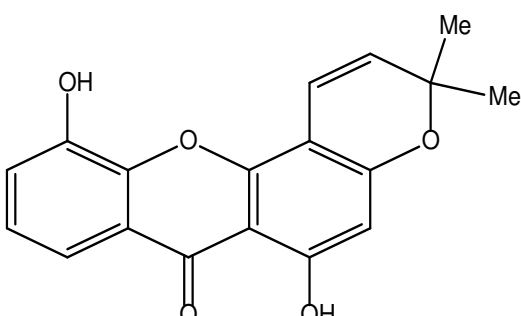
Following compounds have been isolated from the 70% aqueous ethanol extract of the whole plant of *Arenaria serpyllifolia*.

- 1-Hydroxy-5-methoxyxanthone 6-O- β -D-glucopyranoside
- 1,5-dihydroxyxanthone
- 1,5-dihydroxyxanthone-6-O- β -D-glucoside
- 3-(β -D-glucopyranosyloxy methyl)-2-(4-hydroxy-3 methoxyphenyl)-5-(3-aceto propyl)-7-methoxy-(2R,3S) dihydro-benzofuran
- 3-O-methyl quercetin
- 7R,8S-dihydro dehydrodieoniferyl alcohol 9-O- β -D-glucopyranoside
- 16, 23, 28-trihydroxyoleana-11,13(18)-diene-3-O- α -L-fucoside
- 5-hydroxy-1-methoxyxanthone
- 6-deoxyisojacareubin
- Epicatechin
- Japonicumone A 4' -O- β -D-glucopyranoside
- Japonicumone B 3' -O- β -D-glucopyranoside
- Japonicumone B 4' -O- β -D-glucopyranoside
- Japonicumone A
- Japonicumone B
- Pedunculoside
- Phelodendrozide
- Quercetin
- Quercetin 7-O- α -L-rhamnoside
- Quercetin 3-O- α -L-rhamnoside

- Sacranoside A

Structure of phytoconstituents isolated from *Arenaria serpyllifolia*

 <p>1-hydroxy-5-methoxyxanthone-6-O-β-D-glucopyranoside</p>	
 <p>Japonicumone A 4'-O-β-D-glucopyranoside R = β-D-Glc</p>	 <p>R₁=H, R₂= β-D-Glc Japonicumone B 3'-O-β-D-glucopyranoside R₁ = β-D-Glc, R₂ = H Japonicumone B 4'-O-β-D-glucopyranoside R₁ = R₂ = H Japonicumone B</p>
 <p>R₁ = β-D-Glc, R₂ = CH₃CO 3-(β-D-glucopyranosyloxy methyl)-2-(4-hydroxy-3-methoxyphenyl)-5-(3-acetopropyl)-7-methoxy-(2R,3S) dihydrobenzofuran</p>	 <p>Phelodendrazide</p>
<p>R₁ = β-D-Glc, R₂ = H 9-O-β-D-glucopyranoside</p>	

 <p>Pedunculoside</p>	 <p>16, 23, 28-trihydroxyoleana-11,13(18)-diene-3-O-α-L-fucoside</p>
 <p>Epicatechin</p>	 <p>R=R₁=H 1,5-Dihydroxyxanthone R=H, R₁=OGlc 1,5-Dihydroxyxanthone-6-O-β-D-glucoside R =CH₃, R=H 5-Hydroxy-1-methoxyxanthone</p>
 <p>R=H, R₁=OH Quercetin R=Rha, R₁=OH Quercetin 7-O-α-L-rhamnoside R=H, R₁=O-Rha Quercetin 3-O-α-L-rhamnoside R=H, R₁=OCH₃ 3-O-methyl quercetin</p>	 <p>6-Deoxyisojacareubin</p>

CONCLUSION

Several phytoconstituents have been isolated from the plant. As this plant is mainly used traditionally for kidney and bladder complaints in different regions so extensive research on plant can open a new path in discovery of new molecules having potential of treating renal problems. There is also a great potential for different types of pharmacological activities.

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