

COMPARATIVE ANALYSIS OF PHENOLIC COMPOUNDS IN ROOT EXTRACTS OF SALIX ALBA AND SALIX BABYLONICA

*Turdiboyev A.X.,
Imomova M.Y.
Fergana State University*

This study compares the phenolic content of root extracts from two willow species, *Salix alba* (white willow) and *Salix babylonica* (Babylon willow), using High-Performance Liquid Chromatography (HPLC). In *Salix alba*, salicylic acid was found at 14.37 mg/100g, apigenin at 4.21 mg/100g, and rutin at 1.04 mg/100g. In contrast, *Salix babylonica* contained 10.88 mg/100g salicylic acid, 5.95 mg/100g apigenin, and 2.31 mg/100g rutin. These differences may be attributed to species-specific metabolic variations and environmental factors. Both species demonstrated significant levels of bioactive phenolic compounds, particularly with antioxidant, anti-inflammatory, and antiseptic properties. These findings support their potential application in modern phytotherapy.

СРАВНИТЕЛЬНЫЙ АНАЛИЗ ФЕНОЛЬНЫХ СОЕДИНЕНИЙ В КОРНЕВЫХ ЭКСТРАКТАХ SALIX ALBA И SALIX BABYLONICA

*Турдибоев А.Х.,
Имомова М.Ё.
Ферганский государственный университет*

В рамках исследования был проведён сравнительный анализ содержания фенольных соединений (галловая кислота, салициловая кислота, рутин, кверцетин, апигенин) в корневых экстрактах *Salix alba* (белая ива) и *Salix babylonica* (вавилонская ива) методом ВЭЖХ. Установлено, что в экстракте *Salix alba* содержится 14,37 мг/100г салициловой кислоты, 4,21 мг/100г апигенина и 1,04 мг/100г рутина. В то время как в экстракте *Salix babylonica* концентрации составили: салициловая кислота – 10,88 мг/100г, апигенин – 5,95 мг/100г, рутин – 2,31 мг/100г. Эти различия могут быть обусловлены видовой спецификой, климатическими и почвенными условиями. Оба вида богаты биоактивными веществами с выраженной антиоксидантной и противовоспалительной активностью, что подтверждает их ценность в фитотерапии.

SALIX ALBA VA SALIX BABYLONICA ILDIZ EKSTRAKTIDAGI FENOL BIRIKMALARNING QIYOSIY TAHLILI

*Turdiboyev A.X.,
Imomova M.Y.
Farg'ona davlat universiteti*

Ushbu tadqiqotda *Salix alba* (oq tol) va *Salix babylonica* (bobil toli) o'simliklarining ildizidan tayyorlangan ekstraktlarda fenol birikmalar (gallik kislota, salitsil kislota, rutin, kversetin, apigenin) miqdori yuqori samarali suyuqlik xromatografiyasi (YuSSX) usulida aniqlanib, o'zaro qiyosiy tahlil qilindi. *Salix alba* ildizida salitsil kislota 14,37 mg/100g, apigenin 4,21 mg/100g va rutin 1,04 mg/100g ni tashkil etdi. *Salix babylonica* ekstraktida esa salitsil kislota 10,88 mg/100g, apigenin 5,95 mg/100g, rutin esa 2,31 mg/100g bo'ldi. Bu farqlar turlar orasidagi biokimyoviy xilma-xillik, o'sish muhiti, tuproq-tabiiy sharoitlarga bog'liq bo'lishi mumkin. Har ikkala tur ham fenol birikmalarga boy bo'lib, antioksidant, yallig'lanishga qarshi va antiseptik xususiyatlarga ega. Tadqiqot natijalari *Salix* turidagi o'simliklarni fitoterapiyada qo'llash uchun ilmiy asos bo'lib xizmat qiladi.

INTRODUCTION

Phenolic compounds in medicinal plants are one of the main components determining their pharmacological activity. In particular, plants belonging to the willow (*Salix*) genus have been known in folk medicine since ancient times for their anti-inflammatory, analgesic and antiseptic properties. Different representatives of the *Salix* genus have their own biochemical composition, which is influenced by the region in which they grow, climate, soil composition and environmental conditions.

In this study, the phenolic compounds in extracts prepared from the roots of two species growing in Uzbekistan - *Salix alba* (white willow) and *Salix babylonica* (Babylonian willow) - were determined by the high-performance liquid chromatography (HPLC) method and their comparative analysis was carried out. The aim was to determine the quantitative differences in phenolic compounds in the roots of both plants, assess their pharmacological potential and scientifically substantiate their importance in folk medicine and modern phytotherapy.

RESULTS OBTAINED

During the study, gallic acid, salicylic acid, rutin, quercetin and apigenin were determined in *Salix alba* and *Salix babylonica* root extracts by the YuSSX method. The following results were recorded:

The amount of phenolic compounds in *Salix alba* and *Salix babylonica* root extracts, mg/100g.

Fenol birikma	<i>Salix alba</i> (mg/100g)	<i>Salix babylonica</i> (mg/100g)
Salitsil kislota	14,37	10,88
Apigenin	4,21	5,95
Rutin	1,04	2,31
Kversetin	0,50	0,72

It is clear that the *Salix alba* sample is rich in salicylic acid, while the *Salix babylonica* sample is distinguished by a relatively high content of apigenin and rutin.

DISCUSSION AND ANALYSIS

The results obtained show that both willow species contain phenolic compounds that are beneficial to the body. *Salix alba* extract is especially distinguished by its high content of salicylic acid. This substance has anti-inflammatory, analgesic and antipyretic effects and is a key component in the production of modern medicines, especially aspirin.

The high content of apigenin and rutin in *Salix babylonica* extract indicates that this type of plant has advantages in terms of supporting the cardiovascular system, antiallergic and antioxidant properties. Apigenin is a soothing and oncoprotective flavonoid that slows down cell proliferation. Rutin strengthens capillary walls and improves blood circulation.

The detection of gallic acid only in *S. babylonica* samples indicates that other phenolic species may also be present in this type of plant.

CONCLUSION

The study revealed quantitative and qualitative differences in phenolic compounds in the root extracts of *Salix alba* and *Salix babylonica*, confirming that each of them is rich in its own biologically active substances. *Salix alba* is characterized by a high content of salicylic acid and is useful as an anti-inflammatory agent. *Salix babylonica*, on the other hand, is a phytotherapeutic resource that can be used in cardiovascular, immune and oncological diseases due to its richness in apigenin and rutin. The results show that both species are promising plant sources that can be used in modern phytotherapy. In the future, their leaves, bark and other parts should also be studied for their phenolic content.

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