

## Determination of Phenolic Compounds in *Saussurea salicifolia* (L.) DC by HPLC

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**Abstract:** The flavonoid aglycone content of ethyl acetate fraction of *Saussurea salicifolia* (L.) DC was analysed by the HPLC "Agilent" 1100 with Alltech C18  $\mu$ m column, UV254 detector, flow rate: 1 ml/min, mobile phase: acetonitrile: water:acetic acid (36:65:1). Eleven flavonoid aglycones in the ethyl acetate fraction of *Saussurea salicifolia* were detected by HPLC analysis. The quantification of each compound was done according to the peak area measurements which were reported in calibration curves of the corresponding standards. The result revealed that *Saussurea salicifolia* consists of flavonoid aglycones of quercetin (28.62%) and kaempferol (3.01%).

**Keywords:** *Saussurea salicifolia*; HPLC; UV254 detector; quercetin; kaempferol

### INTRODUCTION

*Saussurea* is a genus of Asteraceae comprising about 300 species widespread around the world. *Saussurea* is represented by about 42 species in the flora of the Mongolia and *Saussurea salicifolia* is widespread in the Mongolia (GRUBOV 1982). Species of the genus *Saussurea* are widely used in Mongolian traditional medicine for treatment of influenza, cough with cold, and typhoid fever as antiviral, anti-fever and antitoxic agent. *Saussurea salicifolia* is used in the traditional medicine to make Tsarvon-4, Banzdoo-6, Tanchin-10 and Tuglogunsel for the treatment of lung disease, respiratory tract inflammation, infectious cold, and for the activation of digestive organs (LIGAA 1997).

Previous phytochemical and bioactivity investigations of several species of *Saussurea* by other scientists in the world have revealed the presence of interesting bioactive compounds like flavonoids (JIANG *et al.* 1979; FAN & YOE 2003), lignans (TA-

KASAKI *et al.* 2000; KO *et al.* 2004), sesquiterpene lactones (TODOROVA *et al.* 1991; YANG *et al.* 2004) and  $\gamma$ -linolenic acid (TSEVEGSUREN *et al.* 1997) with antioxidant, anticancer and anti-atherosclerotic activities.

The objective of this study was to identify the flavonoid aglycones present in the *Saussurea salicifolia* using HPLC and authentic standards.

### MATERIAL AND METHODS

**Plant material.** The aerial parts of *Saussurea salicifolia* were collected from the Central part of Mongolia (in Tov Province) in August, 2007. They were dried at room temperature while being protected from direct sunlight.

**Sample preparation.** The air dried plant material (100 g) was exhaustively extracted with 95% ethanol at room temperature. The extract was then filtered and evaporated by a rotary vacuum

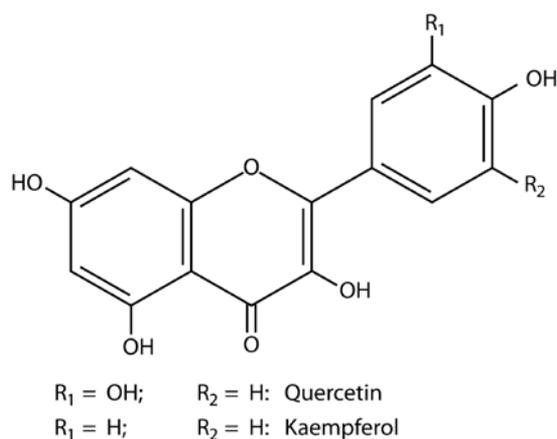


Figure 1. HPLC Chromatogram of flavonoid aglycones of ethyl acetate fraction from *Saussurea salicifolia* (L.) DC

evaporator. Concentrated ethanolic extract of *Saussurea salicifolia* (L.) DC was dissolved in distilled water and then fractionated by re-extracting with *n*-hexane, chloroform, ethyl acetate and *n*-butanol. The ethyl acetate fraction was purified by polyamide column chromatography and then eluted with methanol. The methanol extract was evaporated to dryness under reduced pressure.

**Hydrolysis.** The dry residue was hydrolysed with methanol: sulfuric acid (5:1; V/V) at 100°C for 2 hours.

**Chromatographic equipment and conditions.** After acid hydrolysis treatment, flavonoid aglycone

Table 1. Identified flavonoid aglycones in ethyl acetate fraction of *Saussurea salicifolia*

No.	Flavonoid aglycones	Content (%)
1	quercetin	28.62
2	kaempferol	3.01

content was analysed by the HPLC "Agilent" 1100 with Alltech C18  $\mu\text{m}$  column, UV254 detector, flow rate: 1 ml/min, mobile phase: acetonitrile: water:acetic acid (36:65:1).

## RESULTS AND DISCUSSION

Eleven flavonoid aglycones in the ethyl acetate fraction of *Saussurea salicifolia* were detected by HPLC analysis. Table 1 shows flavonoid aglycones of ethyl acetate fraction identified by HPLC.

The quantification of each compound was done according to the peak area measurements which were reported in calibration curves of the corresponding standards. The result revealed that *Saussurea salicifolia* consists of flavonoid aglycones of quercetin (28.62%) and kaempferol (3.01%). HPLC chromatogram of flavonoid aglycones of ethyl acetate fraction from *Saussurea salicifolia* (L.) DC is presented in Figure 1. Main structures of the flavonoid aglycones found in this study are presented in Figure 2.

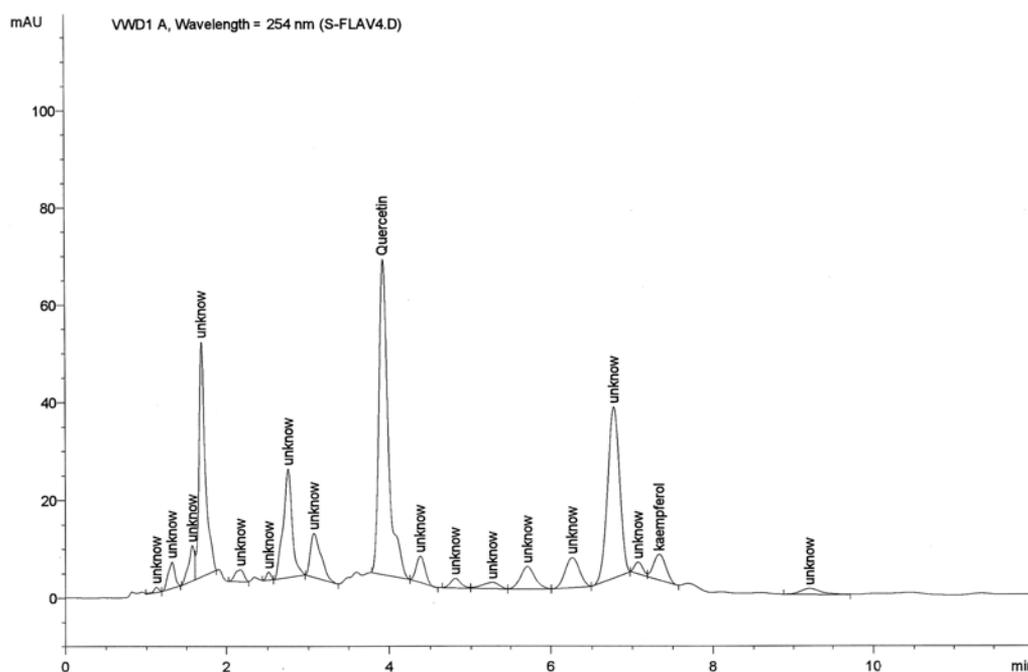


Figure 2. Basic structures of flavonoid aglycones detected in *Saussurea salicifolia* (L.)DC

## CONCLUSIONS

The study was identified the flavonoid aglycones content in ethyl acetate fraction of *Saussurea salicifolia*. According to the results of HPLC analysis, 11 flavonoid aglycones were detected in the ethyl acetate fraction of the *Saussurea salicifolia*. Out of the 11 flavonoid aglycones detected, based on the comparison with authentic standards, two compounds were identified and determined as quercetin (28.62%) and kaempferol (3.01%).

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