

**PHYTOCHEMICAL STUDY OF THE ROOTS OF *Ferula sumbul* (KAUFFM.)
HOOK. ROOT GROWING IN UZBEKISTAN**

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The species of the genus *Ferula* L. (Apiaceae family order Apiales) bolster the number of traditional medicinal agents of Eastern medicine. Worldwide, resin is extracted from five species of the genus *Ferula*: *F. assafoetida* (asafoetida or hing), *F. gummosa* (galbanum), *F. persica* (sagapenum), *F. tingitana* (African ammoniacum) and *F. sumbul* (sumbul). *F. foetida* (Bunge) Regel Eng. Kor. and *F. sumbul* are found in the flora of Uzbekistan and the species *F. foetida* and *F. tadshikorum* are mainly used to obtain resin.

F. sumbul (Kauffm.) Hook. is an endemic plant in Central Asia. The root of it (musk root) contains 5–15% resin, volatile oil, hydroxycoumarins including umbelliferone; sumbulic and angelic acids [1]. Due to the lack of reliable data on volatile compounds and substances of lipid nature, we set the goal of studying the composition of essential oils and fatty acids from the root of this species growing in Uzbekistan. The root was collected in the Kashkadarya region.

The root milling in a coffee grinder was extracted exhaustively first with hexane, then with chloroform–methanol (2:1 v/v) and ethanol. Some of the roots were subjected to hydrodistillation in a Clevenger apparatus [2]. The essential oil and fatty acid methyl esters were isolated and analyzed by GC/MS techniques as previously described [3].

Phytochemical screening of extracts obtained from the studied root showed the presence of terpenoids, lipids, fatty acids, and several volatile components. The essential oil included more than 70 components and was enriched in sesquiterpenes such as δ -cadinene (7.2%), cubebol (6.2%), β -copaene (5.9%), *tau*-cadinol (5.6%), and monoterpene *p*-cymene (4.6%). Other volatile components were detected in quantities ranging from 4.1 to 0.1%.

The hexane extract included fatty acids, esters of aliphatic alcohols with fatty acids, triterpenols, sterols and hydrocarbons. Sterol glycosides, phosphatidic acids, phosphatidylethanolamines, and phosphatidylinositols were identified in the chloroform-methanol extract. Also, coumarin and flavonoid-like compounds were found in the ethanol extract.

The acyl fragments of the lipids were seven saturated ($\Sigma_{\text{Saturated}}$: 39.3%) and four unsaturated ($\Sigma_{\text{Unsaturated}}$: 60.7%) acids. It has been found that major constituents of acids esterified in lipids were octadecanoic (palmitic, 23.6%), (*Z*)-octadeca-9-enoic (oleic, 18.5%) and (*Z,Z*)-octadeca-9,12-dienoic (linoleic 42.1%).

Thus, fatty and essential oil and fatty acid compositions of *F. sumbul* roots were established for the first time.

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References

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