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## Investigation of Compounds from Galbanum (*Ferula gummosa*) Boiss

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**Abstract:** *Ferula gummosa* Boiss. of Apiaceae family is a native wild plant of Iran, growing in the north and west mountainous regions at heights 1800-3000 m above sea level. It is propagated by the seeds at a temperature of below five degrees centigrade. The best planting season are October and November. The extract is used in the manufacture of bonds, textiles and cosmetics. Cut crosswise or longitudinally, the stem yields a sap containing a large quantity of essence, which can be extracted by water-based distillation. The fruit and leaves also contain some light yellow essence containing nitrogenated and sulfurated compounds. Extracted and purified the essence yields the following components. (Distillation of fruit extract yielded 8.4% and that the leaves 0.845% essence). This study indicates that when extracted and purified, the sap of *Ferula gummosa*, thanks to its transparency and high-power bond, can be used to glue on gems and Jewelry. Finally, the extract is used in printing, textiles and perfumery industries.

**Key words:** *Ferula gummosa* Boiss, extract, hygienic cosmetics, bond manufacture, water-based distillation

### INTRODUCTION

*Ferula gummosa* Boiss. is a native Iranian wild plant growing in the northern and western regions of the country. It is one of the most important herbal medicine plant reproduced by the seed which needs stratification to grow. It germinates at a temperature below five degrees centigrade. The response to the washing and chilling treatments is in accordance with results by Negatali *et al.* (2001), who found that, in the natural habitats of *F. gummosa*, higher seed germination percentage occurred in colder regions with higher precipitation. Galbanum (*Ferula gummosa*, Apiaceae), is one of the most important rangeland products of Iran, with a high export demand due to a large number of applications within both traditional medicine and industry (Islami-Manuchehri, 1994). In industries the extract is used in manufacturing bonds to glue on gems and in the hygiene and cosmetic industries to the latter manufacture perfumery. The plant grows in vast areas of Iran and has been used since ancient times (Zargari, 1989). Its main habitats are located within Pakistan, Turkmenistan and a vast area in northeast Iran at an altitude of 2000-4000 m, with average annual precipitation of 250-500 mm (Batuli, 1994). Given its various and sundry values for industrial and medicinal uses and its exportability, a careful overall study of these aspects seems indispensable.

### MATERIALS AND METHODS

*Ferula gummosa* Boiss. is a monocarpic, perennial herbaceous plant which in the early years of its growth bears collar-shaped leaves and in the last year of growth bears stem, flowers and fruits. Finally the root rots and decomposes. It has a thick stem reaching a height of 1-2 m and grayish green leaves covered with tiny short hairs. In its life time, it bears more and larger leaves every year reaching a height of about 30 cm (Zargari, 1989). In its last year of its growth which may vary from the fifth to eighth year, it bears inflorescences and then dies after bearing seeds. The flowers appear to be compound umbels in yellow, with 4-6 branches in each. The fruit is elliptical in shape with a light margin. The root is glandular and rich in sap. Scratched or stung by insects or when sectioned on the root or stem, it yields essence. The sap occurs in two forms. The first is drop sap typically a yellow substance secreted naturally. Heated in ambient temperature, it forms transparent patches on the stem referred to as drop extract. The second type is referred as mass sap produced on sectioning the root or stem crosswise or longitudinally and in color is either brown or dark yellow and at times greenish. The season for harvesting the sap of this plant begins in mid-June and extends to late June. The optimal timing for manual sectioning is during the morning. The proper interval between two successive uses is three years, referred to as

the period. During this period, the plant has enough time to repair the scratch and recreate the sap production. Low rainfall, using the plant results in damaging it. Proper and systematic use can yield the most without damaging the plant cover of wooded areas and pastures. The recommended procedure for using this plant is as follows:

At the end of the growth season, select plants over three years old. Never use plants with inflorescences.

During late June, dig the foot of the selected plants to a depth of 10 cm. The digging direction must preferably be east and north-east in such a way that the base of the plant is cleaned thoroughly.

Remove a circular or elliptical film from the lateral surface of the root at the underlying section of the ring in such a way that depending on the age and size of the plant, the diameter of the film is 2.5-3 cm and the thickness 0.3-0.5 cm and the distance of the film to the ring is 3-4 cm. Following a brief period, which depending on the dryness of the region varies from five to 10 days, use a spatula to remove the product, moving it bottom up. To open up the secreting channel remove a second film two mm thick from the initially scratched surface. Repeat three times collection of product and removal of film from the scratched surface.

## RESULTS

To supply extract from this plant, two sectioning methods are used:

### Cross-Sectional

**Longitudinal section:** The sap was purified using a water-based distillation process for three hours. The essence containing nitrogenated and sulfurated compounds has a light yellow color (Strang *et al.*, 1999). The essence was purified with the aid of a cleveger apparatus in a water-based distillation process. The components of the essence were analyzed using gas chromatography (Adams, 1995; Teglmeler *et al.*, 1994). The most significant components identified are listed in Table 1.

In addition to the sap in the stem and root, there is a certain amount of essence in the fruit and leaf.

Upon distillation with water, the extract in the fruit yielded 8.4% essence and that in the leaf yielded a smaller quantity of essence, i.e., 0.845%.

Table 1: The chemical composition of *Ferula gummosa* Sap

Components	%
$\alpha$ -Thugene	3.3
$\alpha$ - Pinene	18.3
$\beta$ -Pinene	50.1
$\delta$ -3-Carene	6.7
$\beta$ -Phellandrene	0.3
Sabinene	3.1
Other components	18.2

## DISCUSSION

This study indicated that with an approximately 70%  $\alpha$  and  $\beta$  pinene, the sap to *Ferula gummosa* Boiss. can be used to fixate the fragrance of expensive perfumes and generally to contribute to the cosmetic and hygiene industries (Strang *et al.*, 1999; Teglmeler *et al.*, 1994). Moreover, thanks to its transparency and high-power bond, it is used as glue for gems and Jewelry. Finally, the extract of this plant is used to finish and fixate the color of fabrics in the textile industry.

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