

# DETERMINING THE QUANTITY OF IRON FROM ACTIVE VEGETAL PRINCIPLES THROUGH THE ATOMIC ABSORPTION SPECTROMETRY METHOD

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**Abstract:** Studies in this field of specialization include information regarding therapeutic constituents extant in the composition of leaves in plants of the genus *Sedum* (Crassulaceae). This paper is a study about determining the quantity of iron through the atomic absorption spectrometry method in active principles of polyuronide type isolated from the leaves of *Alboroseum Backer* (Crassulaceae). To this purpose, we have used the active principles of the polyuronide type extracted from dry and green leaves collected at different periods of the plant's maturation. The active principles have been obtained through the same method: precipitation with ethylic alcohol 98°. In order to determine the quantity of iron, we have used the spectrometric technique of atomic adsorption in the flame. The results regarding concentration of iron have been similar in both types of active principles, both those extracted from dry and green leaves. It is important to notice that high levels of iron ( $0.0550 \pm 0.0530 \text{ mgFe/g}$  active principle) have been obtained in the period of blossom, when the antibacterial action of the active principle has also been at its highest. We can conclude that it is preferable that the active principle should be extracted from the green leaves of the plant in bloom, because the method is simpler and more rapid.

**Keywords:** polysaccharides, iron, sedum.

## 1. Introduction

Plants of the genus *Sedum* (Crassulaceae) grow mainly in East European regions and a large number of species are used in pharmaceutical products. Traditional medicine uses the leaves and the juice of these plants in all types of inflammatory skin conditions. The active principle is obtained from green or dry leaves.

Studies in this field refer to the compounds extant in plants of the *Sedum* genus. Many of the demonstrated active principles have therapeutic value. Among these active principles, we can mention alkalis, flavonoids, polysaccharides [1]. Considering the previous statements, the plant *Alboroseum Backer* has been studied from the point of view of its chemical composition and pharmacological action [2,3].

This plant is known in Romania not as a medicinal plant, but as a decorative shrub. The juice obtained from the green leaves of this plant has an antibacterial action. Consequently, the active principle responsible for this action has been identified and separated. The active principle obtained is of the polyuronide type [4]. This structure has been confirmed through spectral analysis IR, UV-VIS. NMR [5].

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Analysis of the NMR spectrum has confirmed, on the one hand, the polyuronide type structure, and, on the other hand, it has indicated the existence of a paramagnetic element that proved to be iron. This conclusion has motivated the study concerning the determination of the quantity of iron in active principles obtained from the leaves of the plant at different stages of development, through the atomic absorption spectrometry method [6,7]. Studies in the field do not include data regarding the existence of iron in active principles of the polyuronide type extracted from plants related to the plant under observation.

## 2. Materials and Method

In order to determine the quantity of iron using the spectrometric technique of atomic absorption in the flame, we have used two types of samples of active principle of the polyuronide type:

- a) Active principles separated from fresh leaves collected in the period August 1 – September 22÷25, during the interval 1992÷1994. The active principle has been obtained by precipitation with ethylic alcohol 98° from the watery extract.
- b) Active principles separated from dry leaves collected in the same periods as in (a). The active principle has been obtained by precipitation with ethylic alcohol 98° from the watery extract, after there have been several extractions with selective solvents: ethylic ether, ethylic alcohol, and water.

Polyuronide samples have been solubilized in watery solutions of hydrochloric acid 10%, concentration of the active principle being 0.02 mg/mL.

In order to determine the quantity of iron, we have used the atomic absorption spectrometer of the VARIAN type. The gas combination utilized has been air + acetylene, the temperature of flame 2450°C, and the wavelength 248.3 nm.

## 3. Results and Discussions

Results of the quantitative determinations of iron for the two types of active principles separated from green and dry leaves have been very close (Table 1, Fig. 1).

**Table 1. Concentration of iron in active principles obtained from (1) fresh leaves; (2) dry leaves.**

No	Period	Fe <sup>3+</sup> (mg g <sup>-1</sup> AP)					
		1992		1993		1994	
		1	2	1	2	1	2
1.	1÷2 August	0.0510	0.0520	0.0540	0.0540	0.0520	0.0510
2.	12÷14 August	0.0550	0.0530	0.0560	0.0570	0.0550	0.0550
3.	1÷2 September	0.0320	0.0325	0.0320	0.0320	0.0340	0.0345
4.	10÷12 September	0.0270	0.0270	0.0280	0.0280	0.0270	0.0270
5.	22÷25 September	0.0250	0.0260	0.0260	0.0260	0.0250	0.0250

It is important to note that both types of active principle, those obtained from dry and fresh leaves, have attained the highest levels of concentration of iron ( $0.0550 \pm 0.0530$  mg Fe/g active principle) during the plant's blooming season, August 12-14, in the period of the three years of study. This result can be corroborated with the fact that during this period the respective active principles have a maximum of antibacterial action.

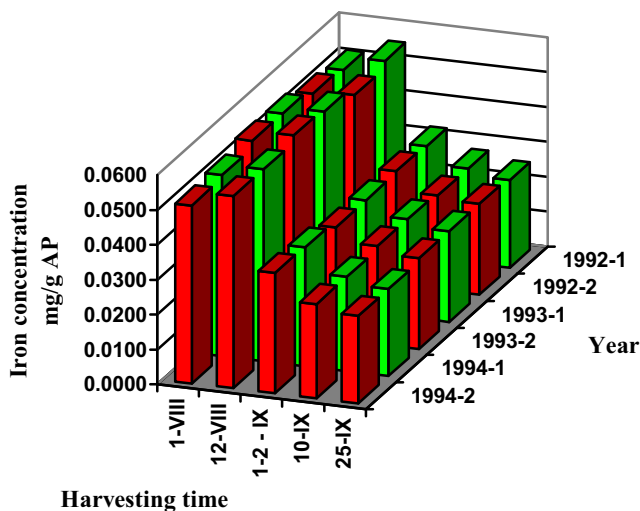


Fig. 1: Dynamics of concentration of iron in active principles obtained from (1) fresh leaves; (2) dry leaves.

#### 4. Conclusions

The study on the determination of the quantity of iron in active principles of the polyuronide type has been finalized with the following conclusions:

1. The levels of concentration of iron for the two types of active principles have been very close.
2. In both types of active principles, concentration of iron has reached a maximum level in the period of bloom, when antibacterial action is also at its highest.
3. There is direct proportional relation between concentration of iron and antibacterial action.
4. As the levels of concentration of iron have been comparable for the two types of active principles, it is preferable that the active principle should be obtained from fresh leaves of the plant in bloom. In this case, the concentration of iron is at its maximum (in both types of leaves) and the method is simpler and more rapid: it does not involve drying the leaves and previous extraction with selective solvents.

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