

## THE STUDY OF PHYTOCHEMICAL CHARACTERS OF *PEROVSKIA ABROTANOIDES* IN KASHAN

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### ABSTRACT

*The studies conducted on plants grown in Kashan have showed the presence of abundant valuable industrial - medicinal plants. Unfortunately, a lot of these plants are removed as weed or grazed by livestock because of Lack of inhabitants' ignorance of their using and mismanagement.*

*Perovskia abrotanoides is of Lamiaceae family. The natural habitat of this plant is mostly near waterways, the beds and borders of seasonal rivers and mountainous ravines, namely the watersheds of south and southeast of Kashan. It is also seen in the borders of gardens and farms in these areas. This plant is mostly seen at the elevations 1500 - 2700 m. Its flowers, leaves and stems contain a lot of essence that can be used in medicine industry.*

*In order to study this plant phytochemically, 6 areas (points) were selected. The average amount of plants' essence obtained from these 6 investigated areas was 4/5 cc(1/44%) in Ferizhend, 3/8 cc(1/1%) in Abyaneh, 2/8 cc(1/12%) in Chimeh, 2/9 cc(0/93%) in Ghohroud, 1/9 cc(0/61%) in Totmaj and 2/3 cc(0/74%) in Jahagh. Moreover determining the amount of existent essence in plant, we proceeded to find four plant materials: Saponin, Alkaloid, Tannin, Flavanoid. The amount of each material in plant was defined qualitatively in which the amount of saponin was considerable.*

**Key words:** *PEROVSKIA ABROTANOIDES, phytochemistry, saponin, Alkaloid, Tannin, Flavanoid.*

### Introduction

In addition to the role of plant species as cover vegetation, their importance in human life as medicine and food supplier have been cleared. The vast plateau of Iran has different climate and vegetation. Iranian flora has a special importance because there are some medicinal plants in Iran that can not be found in other countries.

For better using of plants, planning must be done to recognize and study the possibility of plant cultivation and breeding. These plants are going to be disappeared due to overuse of them.

One of the necessities for recognition of plants is to investigate their chemical components. In past, it was very difficult to recognize these components but nowadays, by means of modern methods and equipments, recognition and extraction of all components are possible.

In this study, in addition to determine the amount of existing essence in plant, four plant metabolites like Alkaloid, Tannin, Saponin, Flavanoid and their amount were assessed qualitatively.

The role of climate and other geographical condition on plant component and the best time for harvesting were also examined. The

*Perovskia abrotanoides* essence had been studied by Forest and Rangelands Research Institute and main components of this species were Tujone (45.9%), Sabinane (26.6%),  $\alpha$ -pinene (12.9%) and 1, 8 Cineol (10.5%).

Some researches done to study the chemical components of *P.atrilocifolia* and *P.abrotanoides* showed that  $\alpha$  and  $\beta$  pinene, camphene,  $\alpha$ -terpinene, Eucalyptus, Linalul, Camphor, Borneol, Menthol Borneel asetate,  $\beta$ -caryophyllen and sedrol were the components of *P.abrotanoides*. These components were reported for *P.atrilocifolia* with the exception of linalul (Pourmortazavi et al, 2003).

Dehghan Menshadi (1994) also recognized the main components of *P.abrotanoides*. Pourmortazavi Ardekani (2001) reported the main components of Balochian Borazombol. These chemical components were 1, 8 cincol, limonene,  $\alpha$ -terpinilastate and camphor. In 1978, the essence of *P.abrotanoides* was studied and antibacterial effect of this species was investigated. In 1982, some experiments were done in order to indicate chemical components of 180 plant species and saponin and Flavanoid were reported in *P.abrotanoides*.

In 1984, the investigation of Terpenoides components of *P.abrotanoides* and *P.angustifolia* in central Asia showed that these species are different in the point of view of amount of components and synthesis of Terpenoides (Grimes et al, 1990).

In 2001, Jasbi showed that 1.5% Tanshinone can be found in *P.abrotanoides* roots. This component is helpful for oriental sore cure. It also blocks the growth of Malaria parasites.

In 1993, some studies on phytochemical characters of plants grown in Kashan were done. These studies were done by Pharmacy Faculty,

Tehran Medical Science University in cooperation with International Research Center for Living with Desert in Kashan as a PhD dissertation.

## Materials and methods

At first, some of plant habitats were shown and marked on Kashan map. Totally, six points were selected. Based on climate, altitude, soil texture and humidity level, the height, refreshness, collar diameter and generative branches of plants were different from each other.

For phytochemical experiments, samples were gathered from these six sites and experiments done in the organic chemistry laboratory of Kashan University and the results compared with each other.

## Site geographical situation and area

The studied site is located between 33° 30' to 34° 30'N and 51° 45'E, with 50000 hectares area. This region is located in Isfahan province and restricted by Qom from north, Natanz from south, Delijan from west and Aran-o-Bidgol from east. The main portions of Kashan at south and south east are mountains regions covering important mountains like Kargaz (3585m) and Kolahbarfi (3155m). The studied area has seasonal rivers, and channels but lacking permanent river.

## Identification of phytochemical of Brozambol

For phytochemical analysis and comparison of different sites, six samples (one sample for each site) were collected. All samples were saved in special pockets. After that, old parts, or past vegetative parts were separated from plants and samples were sent to the

laboratory in order to identify protein percentage, fat, row fiber and ash.

### Phytochemical investigation of Brozambol

For phytochemical investigation, adequate samples were collected from six study points. All samples were analyzed in organic chemistry laboratory of Kashan University. The phytochemical experiments for identification of essence and main component were done three times in two months period. For each site, three experiments and totally, 18 analysis experiments were done. Brozambol essence was prepared using water and vapour distillation and compared with other sites. Then, other experiments on plant extracts were done in order to find four main plant metabolites including saponin, flavanoid, alkaloid and tannin.

In order to prepare plant extract, 100 gr dry plant material was used. This part of experiment is a qualitative distinction. Using some marks like – (high), ++ (low), +++ (moderate) and ++++ (high), each element of plant extract was determined.

For saponin distinction, nearby 1gr Methanol liquid was dissolved in 5 ml distilled water. Saponin amount was determined from + to ++++. For flavanoid distinction, some of methanol liquid was added to water in the presence of 100 mg Mg and 0.5 ml HCl.

Depends on color differs from pink to dark red, the amount of flavanoid was determined. For tannin distinction, dissolved methanol liquid was filtered and divided into two separate tubes.

10% NaCl was added to first tube and 10% NaCl and 1% gelatine added to second tube. By forming or not-forming of sediment and turbidity, the amount of tannin was distinguished and experiment result recorded as + and ++++. For

Alkaloid distinctions, some of Methanol liquid was dissolved in 300 ml of 2% H<sub>2</sub>SO<sub>4</sub>. After filtering, pH was reached to 9-10 using dense NH<sub>3</sub>. This solution was extracted three times using 50 ml chloroform. After distillation in vacuum, densed chloroform dissolved solution was put on silicagel plates. By forming of pink spot, existing or lack of existing of Alkaloid was proved. Regarding to the size and intensity of color, marks as + to +++ were recorded.

### Results

In order to identify Brozambol essence, sampling was done in each point for three times. Totally, 18 samples were used for essence extraction.

The certain weight of each sample was used for essence extraction using water distillation. All aerial parts of plant like flowering branches, inflorescences and leaves have fragrant essence. The investigated essence has specific weight lower than water with yellow color and special smell.

This essence contains camphor, camphene, limonene, cineol and careen.

**Table 1: Average amount of obtained essence from 250gr Brozambol in six points**

Site name	Essence percentage (%)	Essence weight (gr)	Essence (cc)
Farizhanel	1.44	3.6	4.5
Abyaneh	1.1	2.74	3.8
Chimeh	1.12	2.24	2.8
Qahroud	0.93	2.32	2.9
Tatamaj	0.61	1.52	1.9
Jahagh	0.74	1.84	2.3

The experiments were done for measuring essence and amount, and at the same time,

other experiments for existing or lacking plant metabolites (saponin, flavanoid, tannin and Alkaloid) were done.

Based on experiments, the amount of saponin in this plant was high (++++). The other active ingredients (Flavonoid, Tannin and Alkaloid) were not significant to be analyzed or calculated. The results of phytochemical analyzing are shown in table 2.

**Table 2: The results of measuring N, P, K, Ca, Protein and ash weight in *Perovskia abrotanoides***

Region	N (%)	K (%)	Ca (%)	P (%)	Protein(%)	Ash weith (gr)
Farizhend	2.26	2.198	2.6	0.097	14.12	0.87
Abianeh	2.36	2.35	2.6	0.123	14.73	0.91
Chimeh	2.49	2.37	2.6	0.119	15.57	0.88
Ghohrood	2.51	2.33	2.6	0.146	15.69	0.9
Tatmaj	2.58	2.27	3.2	0.121	16.125	0.91
Jahagh	1.86	1.94	3	0.099	11.63	0.9
Mean	2.343	2.253	2.77	0.1175	14.644	0.89

## Discussion

Phytochemical investigation done by different specialists for this plants showed the industrial-medicinal usage of this plant.

This study showed that Brozambol essence contains camphor, campher, Limonen, 1, 8 cineol and caren.

Dehghan Menshadi (1994) also reported these components in addition to  $\alpha$ -pinene, myrsin, transcardinol, Borneol, caryophyllen,  $\alpha$ -pinene, Bisaboloul, Asetat trpinel in *P.abrotanoides*. In other study done on *P.abrotanoides* and *P.atrplicifolia* in Afghanistan, some components like camphen, camphor and  $\alpha$ -terpin, linalool, Borneol, methol, Asetate Borneol,  $\beta$ -caryophyllen and sedrool were recognized (Pourmortazavi et al, 2003).

In experiments done by pourmortazavi (2000), the main ingredients of Balochian Brozambol was recognized. It was revealed that, Balochian Brozambol has 1, 8 cineol, limonenand camphor. In experiments done in 1982 for identification of components in 180 plant species, the presence of saponin and flavanoid were proven in *P.abrotanoides*. This paper showed that saponin amount was considerable but the amounts of flavanoid, supoin and Alkaloid were not calculatable.

In 1984, a study was done on three different *Perovskia* species. It was cleared that these three species have been scattered from east to west of central Asia. They show differences regarding to their ingredients and synthesis of new tripnoides (Grimes et al, 1990).

In this research, it was observed that the amount of essence *P.abrotanoides* was varied due to the climate and altitude conditions.

The expansion of planting of this plant is recommended due to saponin component for industrial and medicinal usages.

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