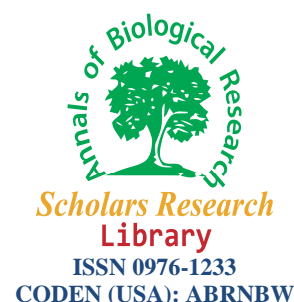




Scholars Research Library

Annals of Biological Research, 2012, 3 (2):975-978
(<http://scholarsresearchlibrary.com/archive.html>)



Study the morphology and essential oil content in two *Satureja khuzistanica* jamzad populations under Tehran climatic condition

*Maryam Kasyani Aval¹, Seyed Reza Tabaei-Aghdaei², Fatemeh Sefidkon², Ali Ashraf Jafari² and Seyed Ahmad Eftekhari³

¹Department of Horticulture, Karaj Branch, Islamic Azad University, Karaj, Iran

²Research Institute of Forests and Rangelands, Tehran, Iran

³Department of Agronomy, Karaj Branch, Islamic Azad University, Karaj, Iran

ABSTRACT

This experiment was conducted to study the morphological features and essential oils content in two *Satureja khuzistanica* Jamzad populations in Tehran ecological conditions. First, seeds of two populations from the species *Satureja khuzistanica* Jamzad were collected from Lorestan Province, Iran. Collected seeds were evaluated to be from the correct genus and species by the help of experts in the Iranian Research Institute of forests and Rangelands. Seeds were planted in proper transplanting trays and at 8-10 leaves stage, healthy plants were transplanted in special pots and finally were moved to the main field. Plants were regularly monitored during the growing period. At full flowering stage, flowering shoots were harvested to measure their essential oil content. To do this, samples were dried under shadow in proper temperature. In laboratory, their essential oils were extracted by the method of water distillation. Results indicated that *S. khuzistanica* 14 had better morphological features such as plant height, branches length, stem length, leaf length / width ratio and canopy diameter than *S. khuzistanica* 13. However, stem length, the number of leaves, the number of branches and leaf length were higher in *S. khuzistanica* 13. Finally, *S. khuzistanica* 13 had higher shoot dry weight and essential oil content that resulted in higher essential oils yield.

Keywords: essential oils, habitat, morphology, *Satureja khuzistanica* Jamzad.

INTRODUCTION

Savory has 15 herbaceous annual or perennial species in Iran. *Satureja khuzistanica* is a savory species which is only find in Iran. Savory is a medicinal plant from Lamiaceae family, *Satureja* genus and different species. They are annual or biennial plants. They are aromatic, highly branched, erected or creeping. Savory is generally a short plant which rarely reaches 60 cm.

Savory shoots are covered with different types of hairs, including nectaries. The number of nectaries varies with species and affects the essential oils of the plant [9].

Savory in Iran grows in different habitats with different climatic conditions. Although savory has the potential to produce essential oils however, environmental factors play vital role on plant content of essential oils. Sefidkon *et al.* (2004) collected eight populations of *S. sahendica* from different habitats and conducted water distillation over them to extract their essential oils [4]. They reported that essential oils content in eight populations varied from 1.53% to 2.88%. Ahmadi *et al.* (2009) also found that ecological factors such as altitude, temperature and humidity had effect on percentage of carvacrol (one of the most important essential oils in savory) [8].

This experiment was conducted to study the morphological features and essential oils variations in two savory populations collected from different habitats of Iran.

MATERIALS AND METHODS

To do this experiment, seeds of two population of savory (*Satureja khuzistanica* Jamzad) were collected from their natural habitats. *S. khuzistanica* 13 was collected from Lorestan province, Poldokhtar area, 80 km from Khorramabad to Andimeshk, and *S. khuzistanica* 14 was collected from Lorestan province, Paelm area. Collected seeds were checked to be from the correct genus and species by the help of experts of Iranian Research Institute of Forests and rangelands. Seed germination assay was conducted and then seeds were planted in transplanting trays containing perlite, and cocopeat, and were irrigated. Seedlings were planted in pots for hardening at 8-10 leaves stage. Finally, transplants were planted in the main field.

Climate conditions of the field. To determine the dry or humid mounts of the year, and to find the overall climatic condition of Tehran, the Walter diagram which is otherwise known as Ombrothermic diagram was used (Figure 1). Although this diagram represents only some general information however, it indicates two important factors: beginning and end of the dry season, and the relative drought intensity. Drought here is a climatic factor which begins when the monthly mean temperature exceeds the two times of the value of total precipitations in the same month.

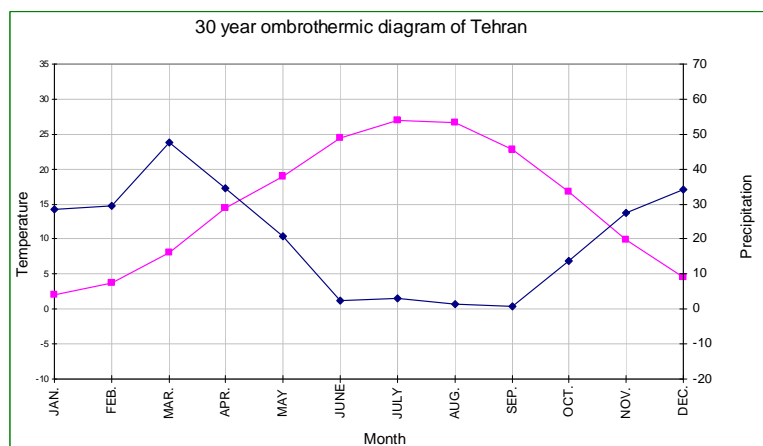


Figure 1. Ombrothermic diagram of Tehran province based on the 30 year statistics.

Plants were regularly monitored for their morphological features during the growing period. To assess the essential oils content, flowering shoots were harvested at full flowering stage and were dried under shadow in proper temperature. In laboratory, samples were subjected to water distillation for 4 h and were demineralized by sodium sulfate. Essential oils content was determined based on the shoot dry weight.

RESULTS AND DISCUSSION

The results of morphological comparisons between the two populations, and their essential oils contents are listed in Tables 1 to 3. Results indicated that populations had different characteristics. *S. khuzistanica* 14 had better plant height, branches length, leaf length / width ratio and canopy diameter, however, *S. khuzistanica* 13 had higher number of leaves, stems and branches and had better stem length and leaf length.

Table 1. Morphological differences between the two populations

Population	Plant height (cm)	The number of leaves	The number of stems	The number of branches	Branch length (cm)	Stem length (cm)	Leaf length (mm)	Leaf width (mm)	Leaf length / width ratio
13	11.96	6.43	7.33	18.26	1.36	11.03	13.10	8.06	1.60
14	12.53	5.70	5.23	15.70	1.46	8.43	12.50	8.06	1.70

According to Table 2, flower length, flower diameter, calyx length and corolla length were higher in *S. khuzistanica* 14. On the contrary, the number of akenes was higher in *S. khuzistanica* 13.

Table 2. Morphological differences between the two populations

Population	Canopy diameter (cm)	Flower length (mm)	Flower diameter (mm)	calyx length (mm)	corolla length (mm)	The number of akenes in flower
13	13.53	11.66	3.43	7.50	8.40	3.90
14	15.70	16.66	3.83	7.66	10.00	3.30

Table 3 also indicates that shoot dry weight and essential oils content were higher in *S. khuzistanica* 13 which resulted in higher essential oils yield.

Table 3. Differences between shoot dry weight, essential oils content and yield in two populations

Population	Shoot dry weight (g/plant)	Essential oil content (%)	Essential oil yield (ml/plant)
13	12.30	1.55	19.065
14	11.00	1.10	12.100

Farsam et al. (2004) reported 0.6% and 1.2% essential oils content in two wild population of *S. khuzistanica* [7]. However, Sefidkon and Ahmadi (2000) reported 3% essential oils content in *S. khuzistanica* [3]. Sefidkon et al. (2004) collected eight populations of *S. sahendica* from different habitats and conducted water distillation over them to extract their essential oils [4]. Their results indicated that essential oils content in eight populations varied from 1.53% to 2.88%. In another experiment, essential oils content of six populations from *S. montana* was evaluated and it was concluded that essential oils content varied from 0.22% to 1.61% [2].

Flowering shoot of savory are usually harvested at the flowering stage and are usually dried under shadow. It is aromatic, it facilitates digestion, it is some kind of antibiotic and it improves general health [1, 5]. The main essential oil in savory is known as carvacrol which is a phenol monoterpene. Carvacrol is a bit sticky transparent liquid which changes to a dark liquid under light and air. Carvacrol is used in hygienic products and is a disinfectant in different sprays. Finally, carvacrol is an antioxidant, anti microbe and anti fungus [6].

Generally, as the two populations were cultivated in the same climatic conditions in Tehran, the variation in morphological traits and essential oils content can be attributed to the genetic factors. High essential oils content and presence of carvacrol in the essential oils compounds of the two species, it can be beneficial to grow savory in different areas.

REFERENCES

- [1] A Emami, MR Shams Ardakani and I Mehregan, Encyclopedia of Medicinal Plants. Traditional Medicine and Materia Medica Research Center (TMRC) Publications, Shaheed Beheshti University of Medical Sciences, Tehran, Iran, **2004**, pp. 449. (In Farsi).
- [2] A Ibraliu, M Ristic, ZD Stefanovic and J Shehu, *Journal of Medicinal Plant Research*, **2011**, 5, 58-62.
- [3] F Sefidkon and Sh Ahmadi, *Journal of Essential Oil Research*, **2000**, 12, 427-428.
- [4] F Sefidkon, Z Jamzad and M Mirza, *Food Chemistry*, **2004**, 88, 325-328.
- [5] F Sefidkon, Z Jamzad and M Barazandeh, *Iranian Journal of Medicinal and Aromatic Plants*, **2005**, 20 (4), 425-439.
- [6] G Leake, F Gasper and R Santos, *Journal of Essential oil Research*, **2003**, 15, 172-177.
- [7] H Farsam, M Amanlou and MR Radpour, *Flavor and Fragrance Journal*, **2004**, 19, 308-310.
- [8] Sh Ahmadi, F Sefidkon, P Babakhanlo, F Asgari, K Khademi and MA Karimifar, *Iranian Journal of Medicinal and Aromatic Plants*, **2009**, 25 (2), 159-169. (In Farsi).
- [9] Z Jamzad, *Iranian Thymes and Savories*. Research Institute of Forests and Rangelands Publications, Tehran, Iran, **2009**, pp. 117. (In Farsi).