

Investigation of Chemical Essential oil Components of *Thymus Kotschyanus* in Zagheh Area (In Lorestan Province)

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Abstract: From 200 genera in Lamiaceae family there are about 4000 species which one of them is *Thymus*. Existence of essence in these species is normal that uses for medicinal, nutritional, toiletry and health industry. The genus includes many species in Iran. This study was conducted components of essential oil in biomass of *Thymus kotschyanus*. Samples were collected in Zagheh area when plant was grown as flowering (in Lorestan Province) in 2011. First of all, anatomical investigations by using coloring and then samples in shadow dried and extracted by Clevenger device as Hydrodistillation method were produced. After producing essences, kind of components and percent of essential chemical components recognized and separated completely by using GC and GC/MS devices. According to components retention volume, retention time, Kovats retention index, mass spectrum and comparing those to standard components the results pointed out that 52 components (about 78.87% of essences in species) as main component such as; Thymol (32.77%), Gamma-terpineol (8.43%), Carvacrol (5.61%), Cynol (4.35%), Borneol (4.35%), Cis-Sabinene hydrate (2.87%), Alpha-terpineol (2.5%) and Gamma-gurjunene (2.17%). This study and most of the other researches had the same results according to main components of essences in the species but deal was different. It may be affected by environmental and husbandry techniques such as; time of collecting, place of plant growing and climatic changes of region factors. These factors effect on biosynthesis of essential in time and place.

Keywords: *Thymus kotschyanus*, Essential oils, Chemical components, Botanical properties, Thymol

Introduction

The Middle East flora is estimated at 15,000 species. The use of medicinal and aromatic plants, herbs and species in the region has a long history and forms an important part of a number of cultures. Traditional medicine still plays a major role in health care systems despite the availability of modern medicine (Heywood, 1999). The collection, grading and processing of medical and aromatic plants is one of the main income generating activities. The great majority of these plants are still collected from the wild thus endangering the existence of many valuable species. Traditional medicine dates back more than 3,000 years in Iran. Evidence of the use of medicinal plants goes back thousands of years when Avicenna, the well-known Iranian medical scientist and practitioner wrote a volume on medicinal plants upon which western medicine was based until the 13th century (Sabra and Walter, 2000). The flowering plant species of Iran have been estimated to be about 8000 (WHO, 2001). Among 300 to 400 species are used for medicinal purposes. It is one of the largest biodiversity regions in the world containing some of the richest countries in plant resources. Medicinal and aromatic plants constitute the basis of primary health care for the majority of the population in Asia and are a critical source of income for rural populations. The book,

Ghanon in Medicine by Avicenna has been used by the European scientific community for more than 600 years. The works of Avicenna and Razes, another famous scientist have been translated into various languages (Mosaddegh and Naghibi, 2003). Lamiaceae family has about 200 genres and 4000 species which one of them is Thymus. Majority species of the family have essence and uses for medicinal, nutritional, toiletry and health industry. The genus includes many species in Iran. The medicinal plants are more valuable that since a long time ago are used for treating skin diseases, food, cosmetic, and health industries and pharmacy and its unique properties were demonstrated. The study also included some of the plants used by rural inhabitants as herbal medicines (Amin et al., 2002). Result of Gersbash's (2002), Baran's(2008) and Buyisile's(2009) research show that there is essential oil resource of above of life of *Prostanthera ovalifolia*, *Salvia argentea* and *Schistostephium heptalobium*. Climate and weather are most factors which effect on essence of medicinal plants in each area (Kroger, 2000). Nickavar *et al.* (2005) research on shoot of *T. daenensis* and to get a result most components of the species is Thymol (about 47%). He also in other research in same year resulted that components of *T. kotschyanus* are Thymol (38.6%), Carvacrol (33.9%), Gamma-terpinene (8.2%) and p-Cymin (7.3%). In studies which have been done among 1991 to 1997 by Stahl-biskup, Jemminez and Salgueral the important essential oil in Thymus, Thymol recognized.

The aim of this study was to recognize components of essential oil in biomass of *Thymus kotschyanus* which collected from Zagheh area of the Lorestan province.

Materials and Methods

Iran with about 1,648,000 km² areas is located in the southwest of Asia and lies approximately between 25N and 40N in latitude and between 44E and 64E in longitude. Iran's important mountains are Alborz and Zagros. Alborz and Zagros Chains stretch in northwest-northeast and northwest- southeast respectively. The area under study is located in 39° 29' 52" N and 48° 44' 12" E (Fig. 1). The average annual rainfall of the area is 490 mm, falling mainly in the autumn and winter. Samples were collected in Zagheh area when plants were grown as flowering (in Lorestan Province) in 2011. At the first time investigated anatomical by using coloring and then samples in shadow dried and extracted by Clevenger device as Hydrodistillation method were produced. After producing essences, kind of components and percent of essential chemical components recognized and separated completely by using GC and GC/MS devices. According to components retention volume, retention time, Kovats retention index, mass spectrum and were comparing to those standard components.

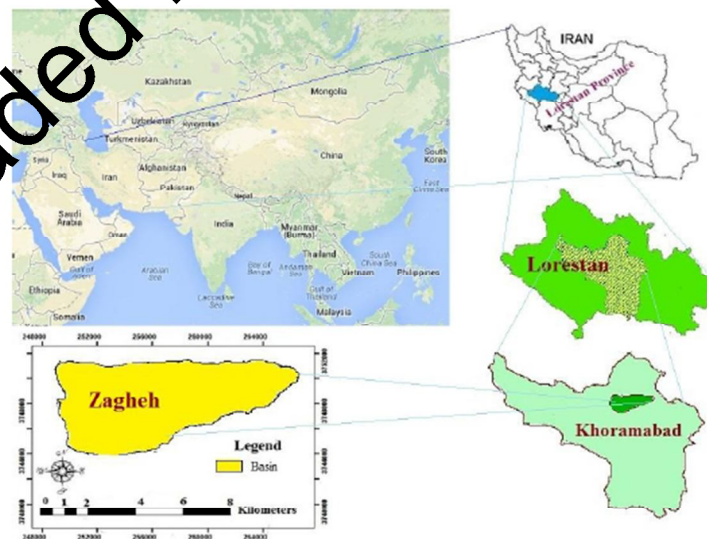


Fig. 1: Location of study area (Iran and Lorestan Province, Zagheh)

Results

Stem of *T. kotschanus*

Cross cutting prepared of the species show that outer layer is epidermis with non-gland secretory and gland secretory (Fig. 2). Next layer is integument of plant with collenchima and parenchyma. After this layer there is Phloem and Xylem then Marrow in center of integument (Fig. 3 and 4).

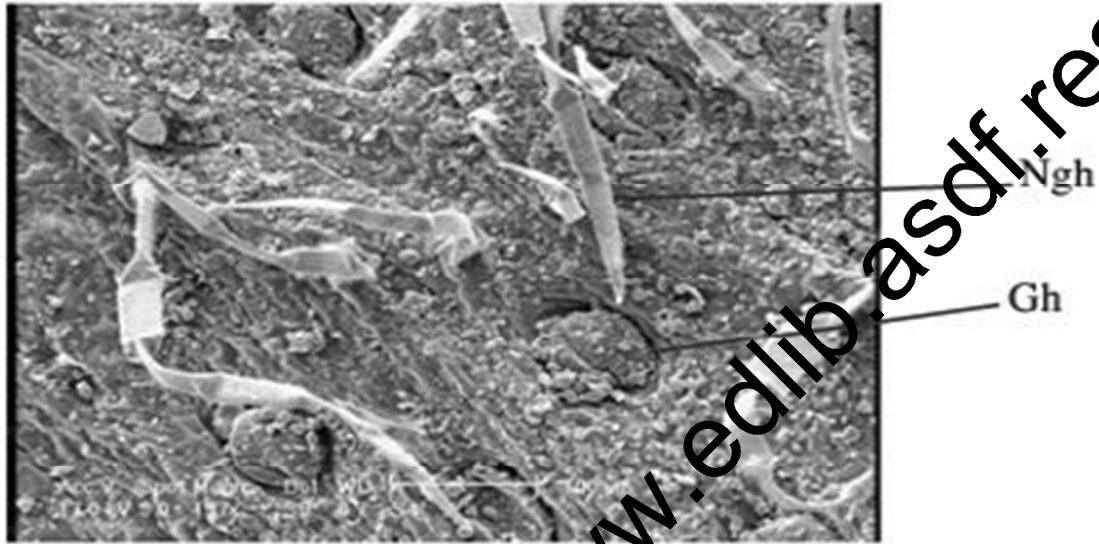


Fig. 2: Stem of the species using by SEM electronical microscope 400X zoom, Ngh: non gland secretory, Gh: gland secretory

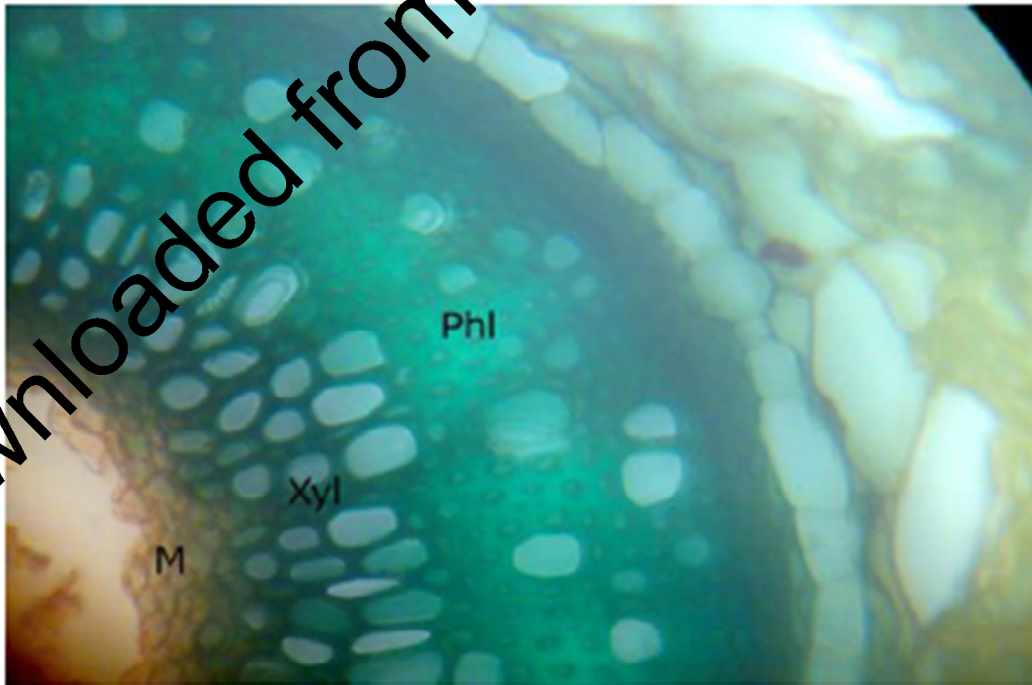


Fig. 3: Cross cutting of *Thymus kotschanus* stem with 400X zoom, Ph: Phloem, Xyl: Xylem and M: Marrow

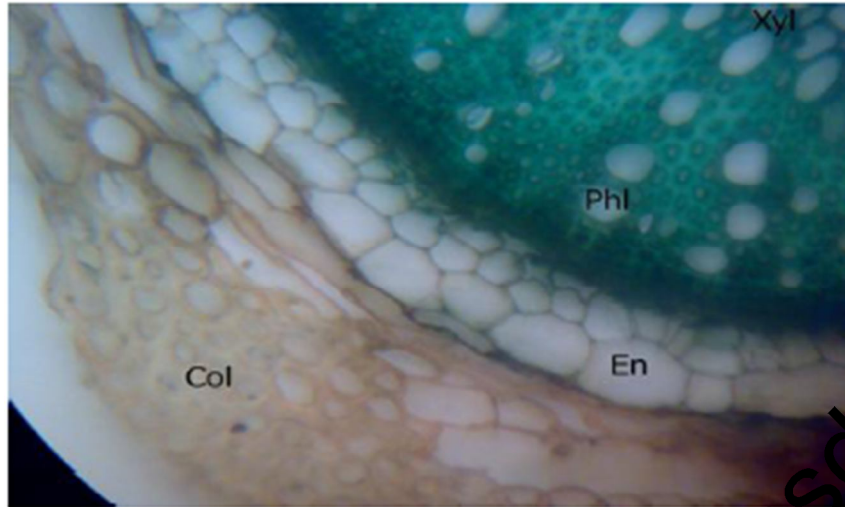


Fig. 4: Cross cutting of *Thymus kotschyanus* stem with 400X zoom, Ph: Phloem, Xyl: Xylem, Col: Collenchima and En: Endoderm

Leaf of *T. kotschyanus*

Microscopic investigations show that leaf of the plant have upper and lower epidermis which in lower epidermis there is fuzz that mainly are non gland secretory and lance-shaped. Fuzzes make by some cells. In the middle there is bunch of Phloem and Xylem (Fig. 5)



Fig. 5: Leaf of *Thymus kotschyanus* using by 400x zoom electronically microscope SEM, Ngh: non gland secretory, Gh: gland secretory

Recognition of components in essence of *Thymus kotschyanus* in flowering stage

According to components retention volume, retention time, Kovats retention index and mass spectrum and comparing those to standard components results show that there is 52 components in essence that formed 78/87% of all essences. Most of the components in the species were Thymol (32/77%), Gamma-terpinene (8/43%), Carvacrol (5/61%), Borneol (4/35) and Cynol (4/35%) (Tab. 1). Essence gas chromatography spectrum of shoot frequency has been showed in flowering stage (Fig. 6).

Discussion

As researchers in previous studies had been pointed out which weather is one of the most important affecting to essential oil in medicinal plants, this study indicates this fact too. Also weather can change number of components and percent of each components of essence in species, because each spices growth in different environmental factors which cause on number of endocrine glands in lower and upper of leaves. This subject has the same result of Gersbash's (2002), Baran's (2008) and Buyisile's (2009) studies. Also deal of percent of components is different may be because of different niche of the species. It may affected by environmental and husbandry techniques such as; time of collecting, place of plant growing and climatic changes of region factors. This factors effect on biosynthesis of essential in time and place.

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