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**Research Article**

# The essential oils composition of *Echinophora cinere*a Boiss in Lorestan province, Iran

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## ABSTRACT

*Echiniphora cinerea* with Persian name of Khosharizeh and the local name of Fialleh, Tige Toragh and Koshander, is a plant of the family umbrella that reaches a height of 30 to 100 cm. *E. platyloba* aromatic herbaceous perennial species in 4 genera and species is endemic to Iran cinerea. During 2015, the aerial parts of platyloba were collected around the city of Khorramabad and its essential oil was prepared by distillation. After phytochemical analysis, it was found that essential oil contained 51 components. The largest percent of *E. platyloba* compound was α-phellandrene. Comparing this plant species collected in different parts of the province showed that the percentage of α-phellandrene varied with another region of the country. *E. platyloba* collected in the Lorestan province had limonene composition that made up the second active ingredient of the plant in the province while the other region this combination was not available.

**Keywords:** Essential oil, Echinophora cinerea Boiss, Lorestan, Iran

## INTRODUCTION

Herbal ingredients including essential oils and extracts of medicinal plants are used as natural components for protection of diseases as safe drugs or food supplements (1). Researches carried out on the essential oils of various plants containing phenolic compounds have shown that they are capable of destroying the bacteria and can be effective in the treatment of various diseases (2). *E. cinerea* with Persian name of Khosharizeh and the local name of Fialleh, a plant of the family umbrella reaches a height of 30 to 100 cm. *Echinophora* in Iran has four species of aromatic perennial herbaceous plant. Two species called Cinerea and Platyloba which are endemic and two other species called Sibthorpiana and Orientalis, in addition to Iran grow in Anatolia, Armenia, Russia, Turkmenistan, Afghanistan, the Balkans, Crete, Cyprus and Syria (3). *E. platyloba* has been

established as spice and flavor of foods (4, 5), having antibacterial and antifungal (6), anti-spasmodic (7), anti-candida albicans (8), dysmenorrhea and menstrual (9), antioxidant effects (10). The aim of this study was to identify chemical substances and active ingredients of E. platyloba in Lorestan province.

## MATERIALS AND METHODS

*Collection and identifying the Echinophora cinerea Boiss*

In this study, aerial parts of *E. cinerea* Boiss from around the city of Khorramabad collected during 2015 and species of plant identified in Razi Herbal Medicine Research Center.

***The extractions of essential oil of Echinophora cinerea Boiss***

The essential oil was prepared by distillation method which was described by Basiri et al (2007). First, aerial parts of the plant were collected and at room temperature in the shade were dried and then ground. Distillation was carried out for 4 hours. Dehydrated carried out by using sodium sulphate and stored at 4°C in dark glasses.

***Identifying chemical compounds of Echinophora cinerea* Boiss**

For identifying chemical compounds of essential oil, GC/mass was used and for further studies gas chromatography coupled with mass spectrometry was used.

**Phytochemicals analysis**

The essential oil was prepared by distillation with water, and chemically was analyzed by using GC/Mass. First aerial parts of the plant were collected and were dried at room temperature in the shade and then ground. Distillation was carried out for 4 hours. Dehydrated was carried out by using sodium sulphate, and stored at 4 ° C in dark glasses (7).

## RESULTS

The results of phytochemical analysis of *E. cinerea* Boiss are mentioned in Table 1. Based on the results of our study, 51 compounds were detected in *Echinophora cinerea* native to Lorestan province (Table 1).

**Table 1:** Different compounds detected in essential oil of aerial parts of *Echinophora cinerea*

| No | EOEC | Cn | Cn+1 | Tn | Sn | Sn+1 | RI | Area% |
|---|---|---|---|---|---|---|---|---|
| 1 | trimethyl cyclopentadiene | 8 | 9 | 7.62 | 6.51 | 8.48 | 856 | 0.7 |
| 2 | m-xylene | 8 | 9 | 7.89 | 6.51 | 8.48 | 870 | 0.06 |
| 3 | α-thujene | 8 | 9 | 9.22 | 6.51 | 8.48 | 938 | 0.99 |
| 4 | α-pinene | 9 | 10 | 9.47 | 8.48 | 10.99 | 939 | 9.79 |
| 5 | Camphene | 9 | 10 | 9.86 | 8.48 | 10.99 | 955 | 0.15 |
| 6 | Sabinene | 9 | 10 | 10.41 | 8.48 | 10.99 | 977 | 0.94 |
| 7 | β-pinene | 9 | 10 | 10.58 | 8.48 | 10.99 | 984 | 0.8 |
| 8 | β-Myrcene | 9 | 10 | 10.73 | 8.48 | 10.99 | 990 | 2.65 |
| 9 | dehydro-1,8-cineole | 9 | 10 | 10.84 | 8.48 | 10.99 | 994 | 0.04 |
| 10 | α-phellandrene | 9 | 10 | 11.38 | 8.48 | 10.99 | 1016 | 32.09 |
| 11 | (MS) | 10 | 11 | 11.47 | 10.99 | 13.76 | 1017 | 0.68 |
| 12 | α-Terpinene | 10 | 11 | 11.57 | 10.99 | 13.76 | 1021 | 0.18 |
| 13 | P-cymene | 10 | 11 | 11.79 | 10.99 | 13.76 | 1029 | 10.75 |
| 14 | limonene | 10 | 11 | 12.01 | 10.99 | 13.76 | 1037 | 16.28 |
| 15 | γ-Terpinene | 10 | 11 | 12.69 | 10.99 | 13.76 | 1061 | 0.73 |
| 16 | α-Terpinolene | 10 | 11 | 13.55 | 10.99 | 13.76 | 1092 | 0.41 |
| 17 | Fenchone | 10 | 11 | 13.59 | 10.99 | 13.76 | 1094 | 0.27 |
| 18 | Linalool | 10 | 11 | 13.74 | 10.99 | 13.76 | 1099 | 0.91 |
| 19 | 6-camphenone | 10 | 11 | 13.78 | 10.99 | 13.76 | 1101 | 0.25 |
| 20 | p-menth-2-en-1-ol | 10 | 11 | 14.58 | 10.99 | 13.76 | 1130 | 0.23 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21 | 1-terpineol | 11 | 12 | 15.08 | 13.76 | 16.6 | 1146 | 0.13 |
| 22 | (MS) | 11 | 12 | 15.55 | 13.76 | 16.6 | 1163 | 0.8 |
| 23 | Safranal | 11 | 12 | 15.85 | 13.76 | 16.6 | 1174 | 0.41 |
| 24 | (MS) | 11 | 12 | 15.92 | 13.76 | 16.6 | 1176 | 0.53 |
| 25 | 4-terpineol | 11 | 12 | 16.15 | 13.76 | 16.6 | 1184 | 0.23 |
| 26 | (MS) | 11 | 12 | 16.26 | 13.76 | 16.6 | 1188 | 0.1 |
| 27 | Cryptone | 11 | 12 | 16.36 | 13.76 | 16.6 | 1192 | 0.09 |
| 28 | (MS) | 11 | 12 | 16.52 | 13.76 | 16.6 | 1197 | 0.26 |
| 29 | A-phellandrene epoxide | 12 | 13 | 17.34 | 16.6 | 19.38 | 1227 | 0.92 |
| 30 | (MS) | 12 | 13 | 17.44 | 16.6 | 19.38 | 1230 | 0.47 |
| 31 | (MS) | 12 | 13 | 18.02 | 16.6 | 19.38 | 1251 | 0.49 |
| 32 | linalyl acetate | 12 | 13 | 18.08 | 16.6 | 19.38 | 1253 | 0.19 |
| 33 | Carvacrol | 13 | 14 | 19.42 | 19.38 | 22.05 | 1301 | 3.79 |
| 34 | (MS) | 13 | 14 | 20.25 | 19.38 | 22.05 | 1333 | 0.25 |
| 35 | α-Terpinyl acetate | 14 | 15 | 20.8 | 22.05 | 24.58 | 1351 | 0.39 |
| 36 | cis- jasmone | 14 | 15 | 22.11 | 22.05 | 24.58 | 1402 | 0.13 |
| 37 | trans caryophyllene | 14 | 15 | 22.99 | 22.05 | 24.58 | 1437 | 0.05 |
| 38 | γ-Elemene | 14 | 15 | 23.16 | 22.05 | 24.58 | 1444 | 0.11 |
| 39 | γ-Curcumene | 14 | 15 | 24.25 | 22.05 | 24.58 | 1487 | 0.15 |
| 40 | Germacrene D | 14 | 15 | 24.52 | 22.05 | 24.58 | 1498 | 0.05 |
| 41 | Kessane | 15 | 16 | 25.74 | 24.6 | 27 | 1548 | 0.54 |
| 42 | Germacrene B | 15 | 16 | 26.45 | 24.6 | 27 | 1577 | 0.21 |
| 43 | caryophyllene oxide | 16 | 17 | 27.08 | 27 | 29.27 | 1604 | 0.1 |
| 44 | Carotol | 16 | 17 | 27.4 | 27 | 29.27 | 1618 | 0.15 |
| 45 | dodecalactone | 16 | 17 | 28.89 | 27 | 29.27 | 1683 | 0.05 |
| 46 | hexadecanal | 18 | 19 | 31.8 | 31.5 | 33.58 | 1814 | 0.08 |
| 47 | neophytadiene | 18 | 19 | 32.3 | 31.5 | 33.58 | 1838 | 0.06 |
| 48 | Palmitic acid | 19 | 20 | 34.77 | 33.58 | 35.61 | 1959 | 1.76 |
| 49 | (MS) | 20 | 22 | 36.88 | 35.61 | 39.6 | 2032 | 0.21 |
| 50 | (MS) | 22 | 23 | 40.6 | 39.6 | 41.93 | 2243 | 6.28 |
| 51 | (MS) | 22 | 23 | 41.93 | 39.6 | 41.93 | 2300 | 2.1 |

The chromatogram obtained from the analysis of the extracts of this plant compounds by GC-MS method shown in Figure 1.

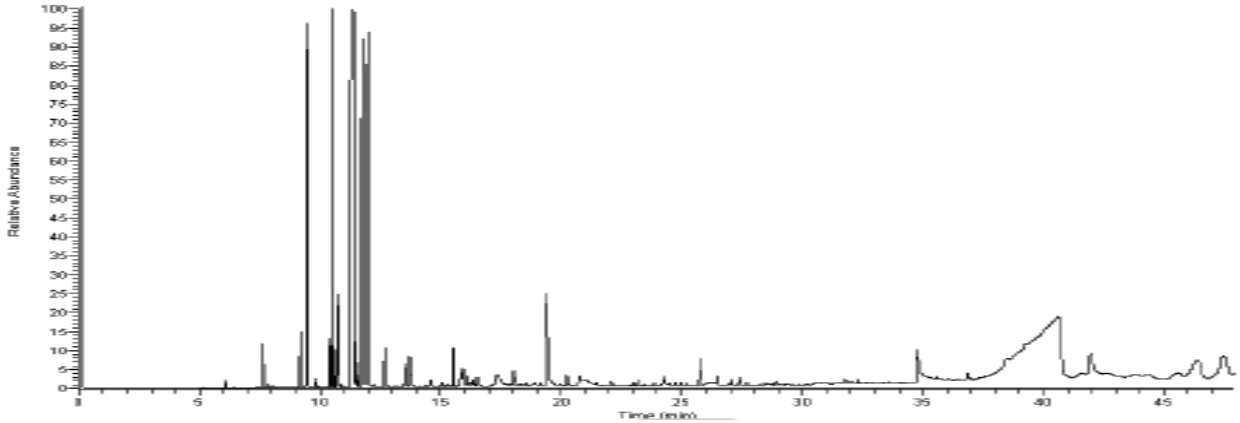


**Figure 1**: Ion chromatography analysis of *Echinophora cinere* extraction by GC-MS method.

## DISCUSSION

As seen in Table 1, the most important compound of E. cinere is α-phellandrene. In another study on E. stibthorpiana, the highest component of the plant analysis has been reported Methy eugenol (11). Also in the E. chrysantha species, α-phellandrens is reported as the highest composition which is similar to present study (12).

Due to the present of proper amount of terpene in E. cinerea, this plant can be used in medicinal and food applications. The essential oil obtained by distillation method with water (Hydrodistillation) the main detected components were P- Seaman (34/43%), α- phellandrene (21/88%), α- pinene (3/31%) and in Headspace solvent microextraction (HD -SME) method the main detected components were α- phellandrene (40/64%), Z-β-osemin (17/28%), P- Seaman (12/84%) and α-pinene (5/18%) (13).
Also, volatile compounds of aerial part of *Echinophora cinerea* by GC and GC-MS have been studied in Iran. Around 27 components were identified, which the main ones were α-phellandrene (40/6%), α- pinene (16/5%), β-phellandrene (9/8%), P-Seaman (7/5%), linalool (5/4%) and citronellol (4/8%), respectively (14). In another study in Fars province, the main compounds of essential oil of *Echinophora cinerea* in flowering branches were identified α-phellandrene 19 (61/4%), β- phellandrene (10/7%), α- pinene (9/6 %), and P - Seaman (6/1%) (15). Examining the essence of platyloba revealed 51 combinations which the highest level was alpha phellandrene with 32.09 percent. Comparing this plant species collected in different parts of the Lorestan show that the main composition of the plant is α-phellandrene, but the percentage varies with the other parts of the country. *Echinophora platyloba* collected in the Lorestan province has limonene composition that makes up the second active ingredient of the plant in the province while in the other regions this combination is not available. The differences in phytochemicals, especially in various types of ocimene might be derived from harvest time as well as local climatic or seasonal factors. However, further studies are needed to clarify it. Regarding the differences in activities of various components of the plant, the differences between components of the essential oil seem to be important in medicinal and nutritional properties and uses. Furthermore, the main components of the plant essential oil have antioxidant activities. Antioxidants are effective in combating free radicals. Hence, they are effective against oxidative stress induced various diseases (16-19). It should be noted that extracts prepared from plants have mostly high flavonoids with antioxidant activities (20-23). Medicinal herbs have effective ingredients which have various therapeutic effects (24-27). Hence, they may have better effects on various diseases

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