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Research Article

ANALYSIS WITH EVALUATION OF DRYING TEMPERATURE ON ESSENTIAL OIL CONTENT OF ACHILLEA FRAYRANTISSIMA L. AND ARTEMISIA HERB-ALBA L.

[1]IBRAHIM S.ABAAS, [2]*MOHAMMED. J.HAMZAH, [1]ALI.H.MAJEED

[1]Department of pharmacognosy and Medicinal Plants, College of Pharmacy, University of Kerbela, Iraq, [2]Department of pharmaceutical chemistry, college of pharmacy, university of Kerbela, Iraq. Email: mohammedlord2003@yahoo.com

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ABSTRACT

Objective: The study was designed to analysis and investigate the effect of drying temperature on essential oil content of leaves of Achilla frayrantissma L and Artemisia herb-alba.

Methods: The plant samples were collected from kerbala desert during flowing stages. Samples were placed in forced-air chamber for drying under constant temperature of 35, 40 and 45^{0}C. The volatile oils were obtained by steam distillation processes. Constituents of the volatile oils were determined by gas chromatography.

Results: The results were referred to major constituents of essential oil A.frayrantissma were thoujone(57.5%) and santolina alcohol(31.4%), while the major constituents of essential oil A.herb alba were camphor(37.3%) and piperton(27.4%). The results shows that increasing of drying temperature caused reduction of essential oil content of both plants. Essential oil content of leaves was maximum at 35^{0}C and reached to (0.81%) and (1.57%) of A.frayrantissma and A.herb-alba respectively, while the minimum content was obtained at 45^{0}C and reached to (0.70%) and (1.35%) of both plants respectively.

Conclusion: Rapid drying of flowers or leaves helps to retain their color and aromatic drug aroma, but the temperature used in each case must be governed by the constituents and physical nature of the drug.

Keywords: Medicinal plants A.chillea frayrantissma, Artemisia herb-alba, Gas chromatography.

INTRODUCTION

During the last century the practice of herbalism has become mainstream throughout the world. In spite of the great advances observed in modern plants still make an important contribution to health care [1]. Achillea frayrantissima L is a fragrant, white, wooly, perennial herb known in Iraq as Qayssom[2]. This wild plant, common in the west desert of Iraq, it's used to relieve gastrointestinal pains, cure bronchitis and treatment of stomach ailments[3]. The plant has a relatively high essential oil content (0.9% V/W) that gives plant a characteristic, pleasant aroma[4]. Earlier research indicated the essential oil has antimicrobial activity against different bacteria and fungi[5]. Artemisia herb-alba L. known in Arabic as shih, is aperennial, small shrub with pubescent leaves. The aromatic desert plant, which grows naturally in west desert of Iraq [6]. A.herba-alba is commonly used by the local population as a cardiotionic, antihelmintic, antispasmodic, stomachic, expectorant and analgesic [7]. The genus Artemisia is a rich source of sesquiterbenoids, which are receiving renewed phytochemical attention due to the biological and chemical diversity [8]. Many factors affect the level of active ingredients, including cultivar, species, number of years of cultivation growing condition and environment [9]. The information on appropriate during temperature of A.frayrantissima and A.herba- alba pre extraction of essential oil is very limited.The objectives of this study was evaluate were included chemical analysis of essential oil and evaluation the effect of drying temperature on essential oil content.

MATERIAL AND METHODS

The samples were collected from Karbala desert during flowering stage. Samples were subsequently divided into three groups and placed in forced-air dryers(Environmental Chamber, model 217502.Hotpack crop, Philadelphia, PA) for drying under constant temperatures of 35, 40 and 45^{0}C. For distillation, the plant material was mixed with distilled water (plant: water, 1:5, w: w) in a two – liter, round bottom, quick –fitted flask. After complete distillation (2-4 h.), the collected oil was dried by passing over anhydrous sodium sulfate on a filter paper (what-man No.1) in a glass funnel.The dried oil was stored at -10C^0 in the dark.The yield, specific gravity, refractive index, acid and ester values of the oil were determined according to previously described procedures [10]. Constituents in the oil were determined in a sample subjected to analysis by gas chromatography. The extracted oil has been diluted with n-hexane, injected in to GLC using an auto – sampler and the different compounds have been separated on a HP-INNOWOAX (60x0.25x0.25µm) capillary column. Helium was used as carrier gas (flow rate 1.5 ml.min^{-1}). The temperature program was 35C^{0}to 230C^0(2.5C^{0}Per min)in course of time (92mm), injector temperature was 205C^{0}and flame ionization detector used, area percentage, were obtained using a PC programmer (Maesto chromatograph data system). For identification of single compound internal and external standard substances have been used, the external standard was obtained from Oma company for chemical compounds.

RESULT AND DISCUSSION

The aerial parts of A.frayrantissma was dried at 35C^{0}yielded a yellowish colored essential oil (0.81%) that had a fragrant, pleasant aroma while the aerial parts of A.herb-alba was dried at 35C^{0}yielded an essential oil (1.57%), The physical and chemical characteristics of essential oils from both plants were tabulated in Table(1). GLC analysis indicated the presence of 18 identified and unidentified components of which the five identified compounds constituted 97.1 percent of the oil with thujone (57.5% of total oil) and santoilna alcohol (31.4%of total oil)as the major constituents (Table 2).

Table 1: Physical and chemical characteristics of A.chillea frayantissma and Artemisia herb-alba essential oils.

Sample	Specific gravity	Refractive index	Acid value	Ester value
A.chilled frayrantissma	0.90	1.47	0.38	33.70
A.rtemisla herb-alba	0.93	1.48	6.21	11.43

Table 2: Constituents in the essential oil of A.chillea fryrantissma identified by gas chromatography.

Constituents	Retention time(min)	Content(%)
Eugenol	9.27	5.4
Methyl chavicol	12.62	0.2
Santoilna alcohol	3.78	31.4
Santoilnatriiene	1.91	2.6
Thujone	4.91	57.5

A.herb-alba yielded an essential oil (1.57%)containing 20 identified and unidentified component of which the six identified compound constituted 91.8 percent of the oil with camphor being the major constituent (37.3%of total oil). The essential (Table 3) extracted from A-fryrantissma in this study had physical constants slightly different from those previously reported for this oil [11, 12]. The characteristics pleasant aroma was probably due to the high content of oxygenated compounds and may explain the name frayrantissma applied to this A.chillea species.This results indicated that the oil of A.frayrantissma was free of the aldehydes and acids mentioned in previous investigation [12].

Table 3: Constituents in the essential oil of Artemisia herb-alba identified by gas chromatography.

Constituents	Retention time(min)	Content(%)
B-pinene	2.34	2.0
Camphor	5.46	37.3
Carvone	8.61	8.5
Chrysanthenone	3.86	16.6
Ethyl cinnamate	29.69	0.1
Piperitone	8.62	27.4

Also p-cymene and ∝-terpineol, previously identified in the essential oil of A.frayrantissma, were not detected, suggesting that these constituents are artifacts formed during steam distillation of oil, but not during the water distillation of oil, but not during the water distillation method used in this study. In practice, differences in oil constituents can vary considerably due to reactions that occur during distillation and source of the plant tissue. Differences in geological and ecological factors ofthe growth environment probably explain the lack of ∝-pinene, myrcene sabinene, linalool and 1, 8-cineole in A.frayrantissma in this study as compared with other studies[13]. The constituents of essential oils are known to be affected by growth season and the plant part from which the oil is extracted [14].

Artemisia ketone, an irregular monoterpene ketone, and artemisia alcohol were not detected as constituents of A.herb-alba. This data for A.herb-alba differed in the priority concentration of the main constituents, probably due to changes affected by the growing season, even though essential oil composition is largely determined by genetic factors [15, 16].

Essential oil content of both plants was varied with drying temperature, The results were showed that increasing of drying temperature caused reduction of essential oil content of A.frayrantissma and reached to (0.70%) as minimum value at 45C^{0}compared with maximum value was obtained at 35C^{0}and reached to (0.81%) Table (4).

Table 4: Effect of drying temperature on essential oil content(%).

Sample	Drying temperature (C^0)	Essential oil content
A.chillea frayrantissma	35	0.81
	40	0.78
	45	0.70
Artemisia herb-alba	35	1.57
	40	1.39
	45	1.35

The same results were obtained of A.herb-alba, plant, the essential oil content was decreased at 35, 40 and 45 C^{0}respectively (Table 4). The maximum value of essential oil content was obtained at 35C^{0}andreached to (1.57%) while the minimum value was obtained at 45C^{0}and reached to (1.35%). The reduction of essential oil content with relatively increasing of drying temperature may be due to volatilization of essential oil by higher temperature [17-19].

CONCLUSION

The results of this study demonstrate that post-harvest processing such as drying temperature play an important role in the content of essential oil of A.frayranissma and A.herb-alba. Rapid drying helps flowers and leaves to retain their color and aromatic drugs their aroma, but the temperature used in each case must be governed by the constituents and the physical nature of the drug. As general rule, leaves herbs and flowers may be dried between 20 and 40C^0.

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